EXHIBIT 1

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Kerkes

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(54) **METHODS AND APPARATUS TO IDENTIFY MEDIA PRESENTATIONS BY ANALYZING NETWORK TRAFFIC**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **18/522,843**

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Related U.S. Application Data

(63) Continuation of application No. 17/959,060, filed on Oct. 3, 2022, now Pat. No. 11,877,028, which is a continuation of application No. 17/068,533, filed on Oct. 12, 2020, now Pat. No. 11,463,770, which is a continuation of application No. 16/209,897, filed on Dec. 4, 2018, now Pat. No. 10,805,690.

(51) **Int. Cl.**

H04N 21/442	(2011.01)
H04H 60/29	(2008.01)
H04L 41/50	(2022.01)
H04L 43/06	(2022.01)
H04L 67/50	(2022.01)
H04N 21/233	(2011.01)
H04N 21/234	(2011.01)
H04N 21/24	(2011.01)
H04N 21/647	(2011.01)

(52) **U.S. Cl.**

CPC ***H04N 21/44224*** (2020.08); ***H04N 21/233*** (2013.01); ***H04N 21/23418*** (2013.01); ***H04N 21/2402*** (2013.01); ***H04N 21/64738*** (2013.01); *H04H 60/29* (2013.01); *H04L 41/50* (2013.01); *H04L 43/06* (2013.01); *H04L 67/535* (2022.05)

(58) **Field of Classification Search**

None

See application file for complete search history.

(56) **References Cited**

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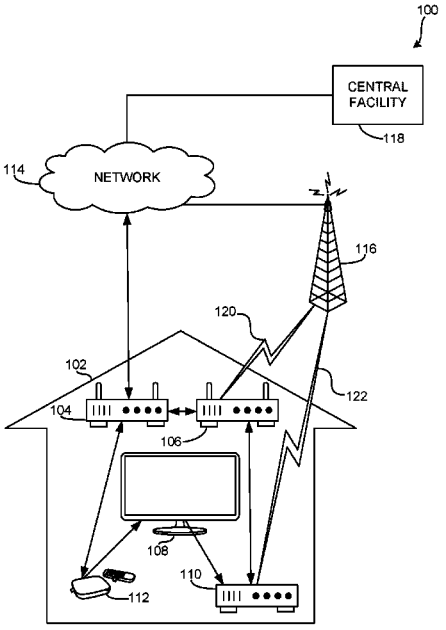
* cited by examiner

Primary Examiner — James R Marandi

(57) **ABSTRACT**

Methods, apparatus, systems, and articles of manufacture are disclosed herein to identify media presentation by analyzing network traffic. Example instructions cause a machine to generate a traffic profile to reduce a computational burden of identifying streaming media being presented on a media presentation device, the traffic profile including first network traffic data indicative of the streaming media; obtain the traffic profile and second network traffic data corresponding to the streaming media; and generate, in response to a score for the second network traffic data meeting a threshold of similarity, a network traffic analysis report identifying the streaming media being presented on the media presentation device.

22 Claims, 10 Drawing Sheets



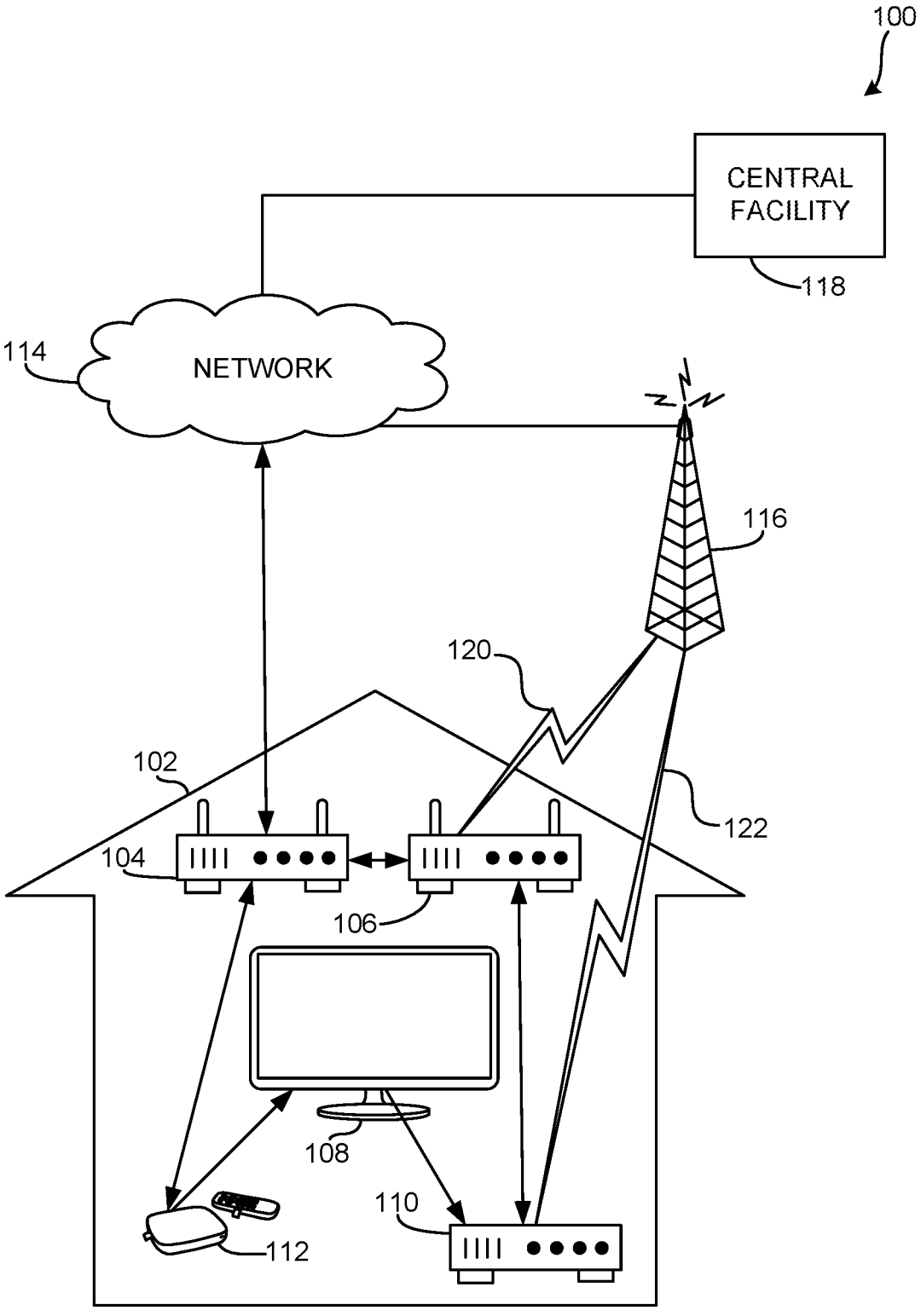

100
CENTRAL FACILITY
118
NETWORK
114
116
120
102
122
104
106
108
110
112

FIG. 1

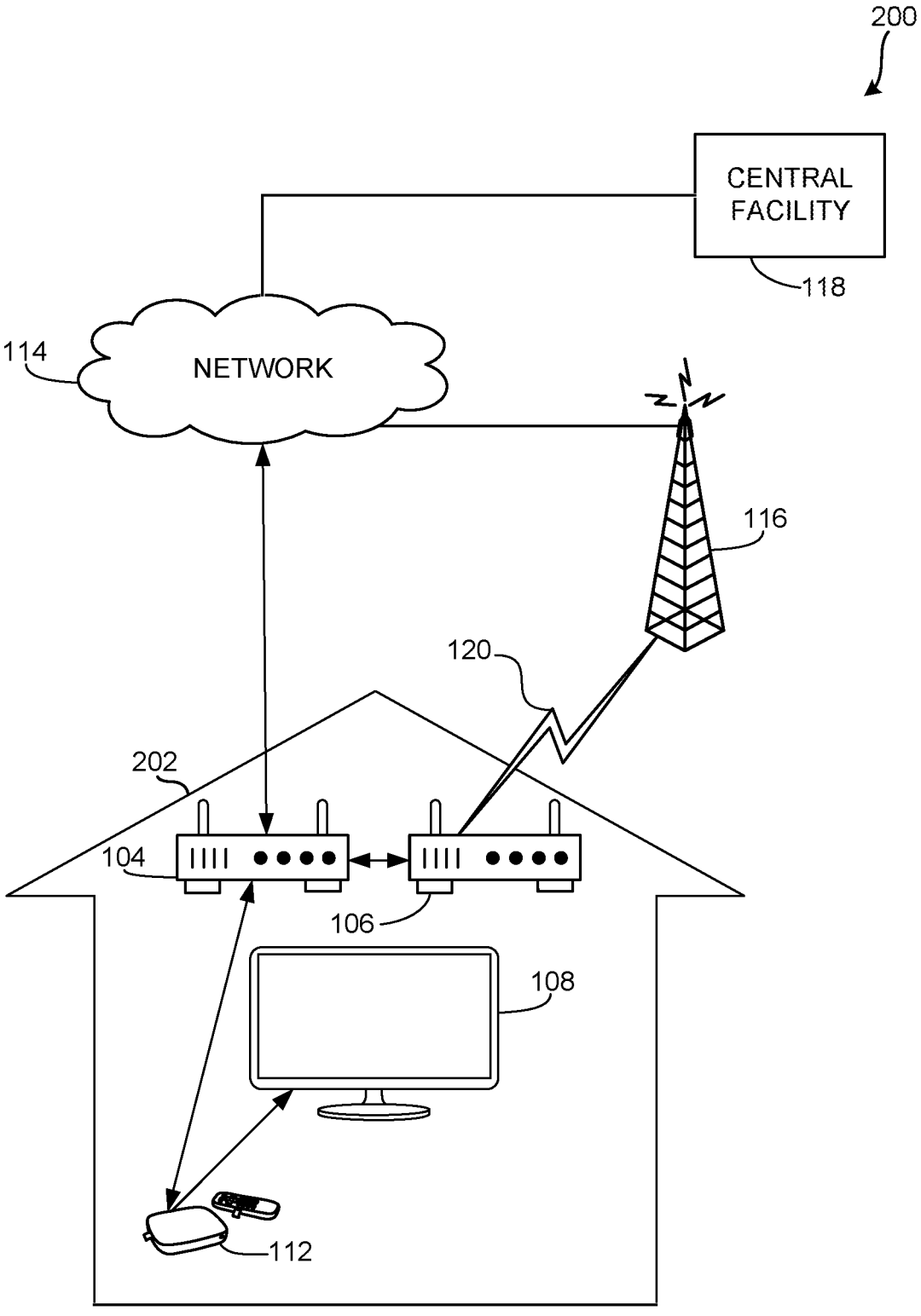

200
CENTRAL FACILITY
118
NETWORK
114
116
120
202
104
106
108
112

FIG. 2

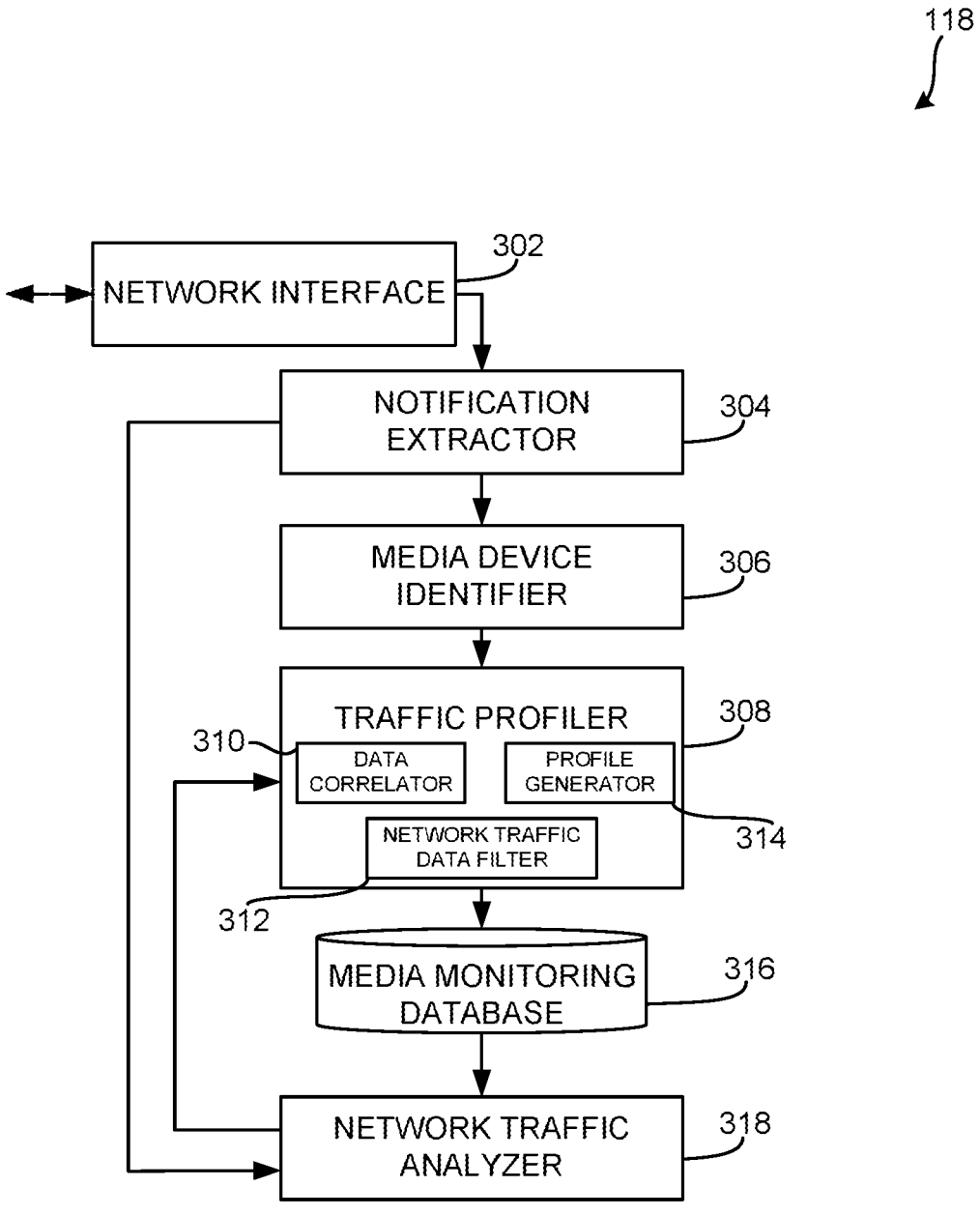

118
NETWORK INTERFACE
302
NOTIFICATION EXTRACTOR
304
MEDIA DEVICE IDENTIFIER
306
TRAFFIC PROFILER
308
310
DATA CORRELATOR
PROFILE GENERATOR
314
NETWORK TRAFFIC DATA FILTER
312
MEDIA MONITORING DATABASE
316
NETWORK TRAFFIC ANALYZER
318

FIG. 3

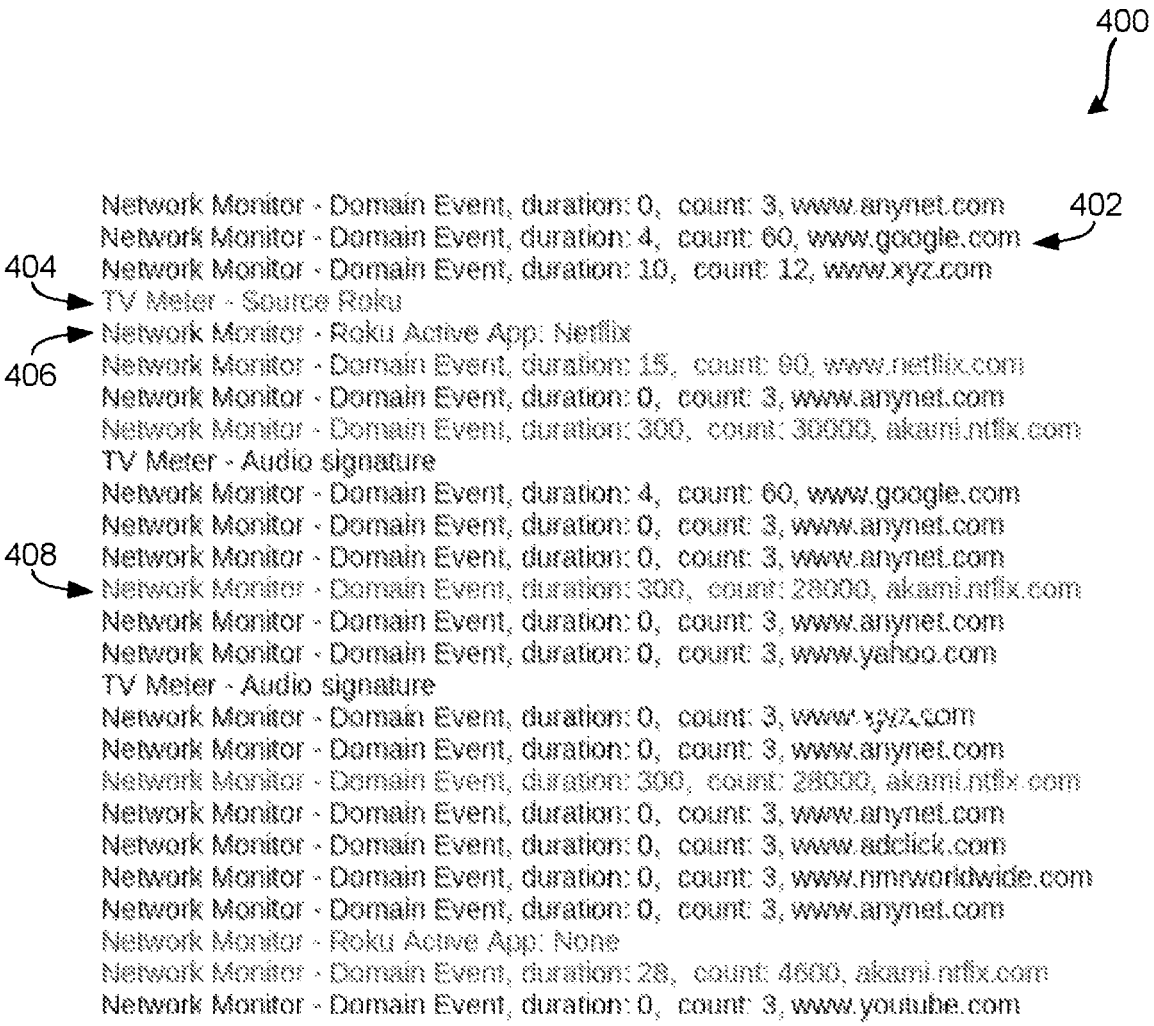

400
402
404
406
408
Network Monitor - Domain Event, duration: 0, count: 3, www.anynet.com
Network Monitor - Domain Event, duration: 4, count: 60, www.google.com
Network Monitor - Domain Event, duration: 10, count: 12, www.xyz.com
TV Meter - Source Roku
Network Monitor - Roku Active App: Netflix
Network Monitor - Domain Event, duration: 15, count: 90, www.netflix.com
Network Monitor - Domain Event, duration: 0, count: 3, www.anynet.com
Network Monitor - Domain Event, duration: 300, count: 30000, akami.nflx.com
TV Meter - Audio signature
Network Monitor - Domain Event, duration: 4, count: 60, www.google.com
Network Monitor - Domain Event, duration: 0, count: 3, www.anynet.com
Network Monitor - Domain Event, duration: 0, count: 3, www.anynet.com
Network Monitor - Domain Event, duration: 300, count: 28000, akami.nflx.com
Network Monitor - Domain Event, duration: 0, count: 3, www.anynet.com
Network Monitor - Domain Event, duration: 0, count: 3, www.yahoo.com
TV Meter - Audio signature
Network Monitor - Domain Event, duration: 0, count: 3, www.xyz.com
Network Monitor - Domain Event, duration: 0, count: 3, www.anynet.com
Network Monitor - Domain Event, duration: 300, count: 28000, akami.nflx.com
Network Monitor - Domain Event, duration: 0, count: 3, www.anynet.com
Network Monitor - Domain Event, duration: 0, count: 3, www.adclick.com
Network Monitor - Domain Event, duration: 0, count: 3, www.nmnworldwide.com
Network Monitor - Domain Event, duration: 0, count: 3, www.anynet.com
Network Monitor - Roku Active App: None
Network Monitor - Domain Event, duration: 28, count: 4500, akami.nflx.com
Network Monitor - Domain Event, duration: 0, count: 3, www.youtube.com

FIG. 4

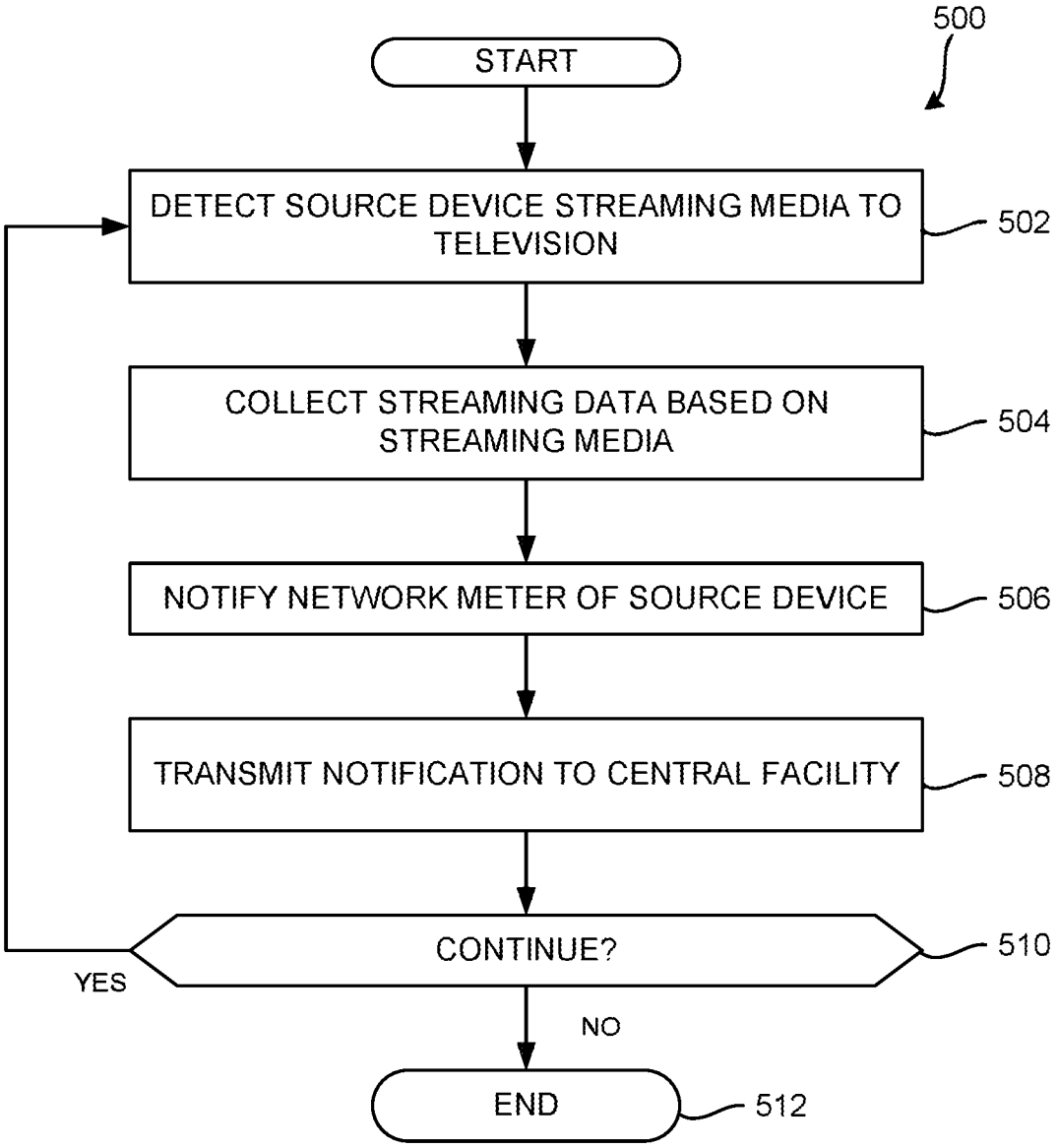

500
START
DETECT SOURCE DEVICE STREAMING MEDIA TO TELEVISION
502
COLLECT STREAMING DATA BASED ON STREAMING MEDIA
504
NOTIFY NETWORK METER OF SOURCE DEVICE
506
TRANSMIT NOTIFICATION TO CENTRAL FACILITY
508
CONTINUE?
510
YES
NO
END
512

FIG. 5

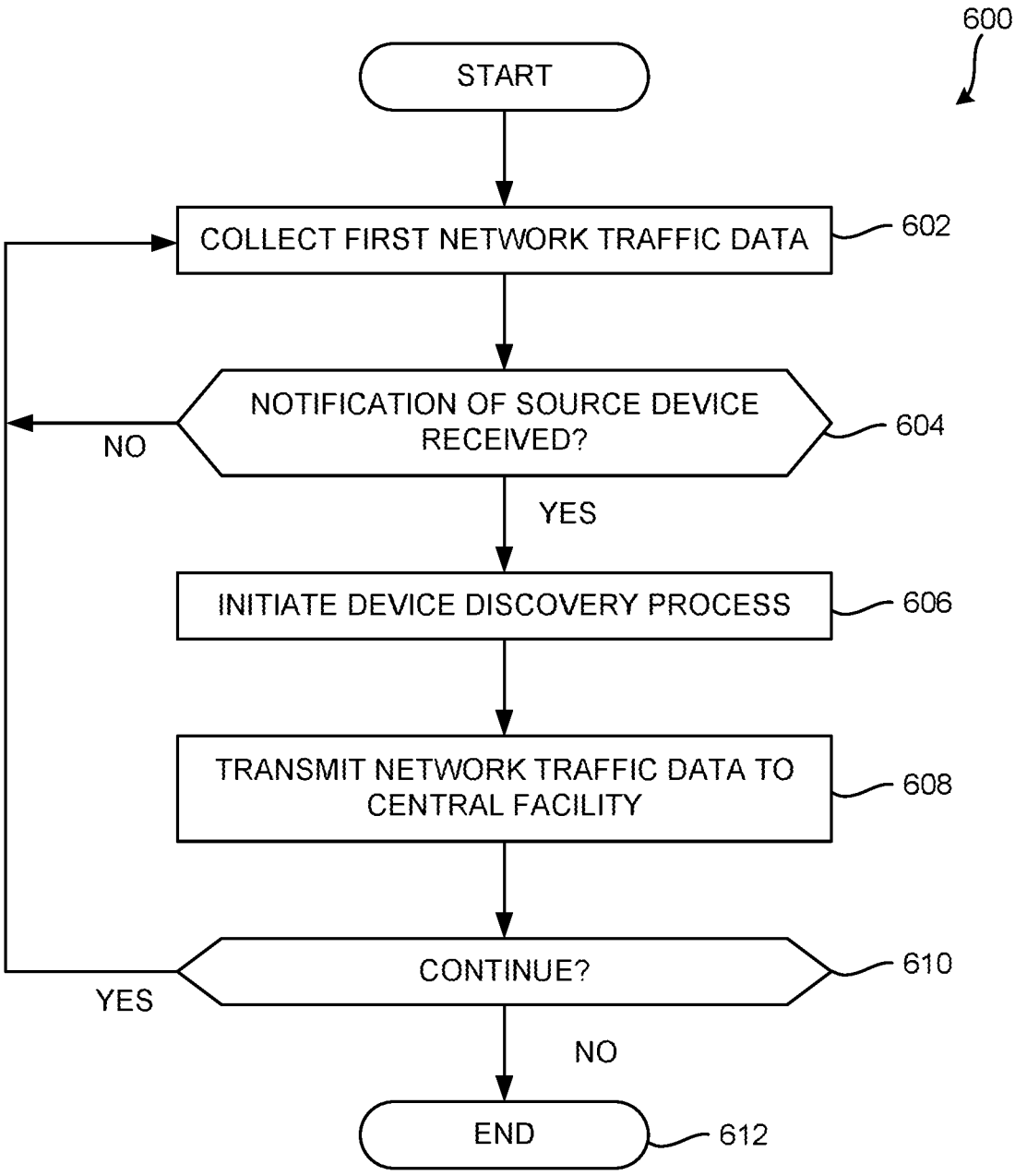

600
START
COLLECT FIRST NETWORK TRAFFIC DATA
602
NOTIFICATION OF SOURCE DEVICE RECEIVED?
604
NO
YES
INITIATE DEVICE DISCOVERY PROCESS
606
TRANSMIT NETWORK TRAFFIC DATA TO CENTRAL FACILITY
608
CONTINUE?
610
YES
NO
END
612

FIG. 6

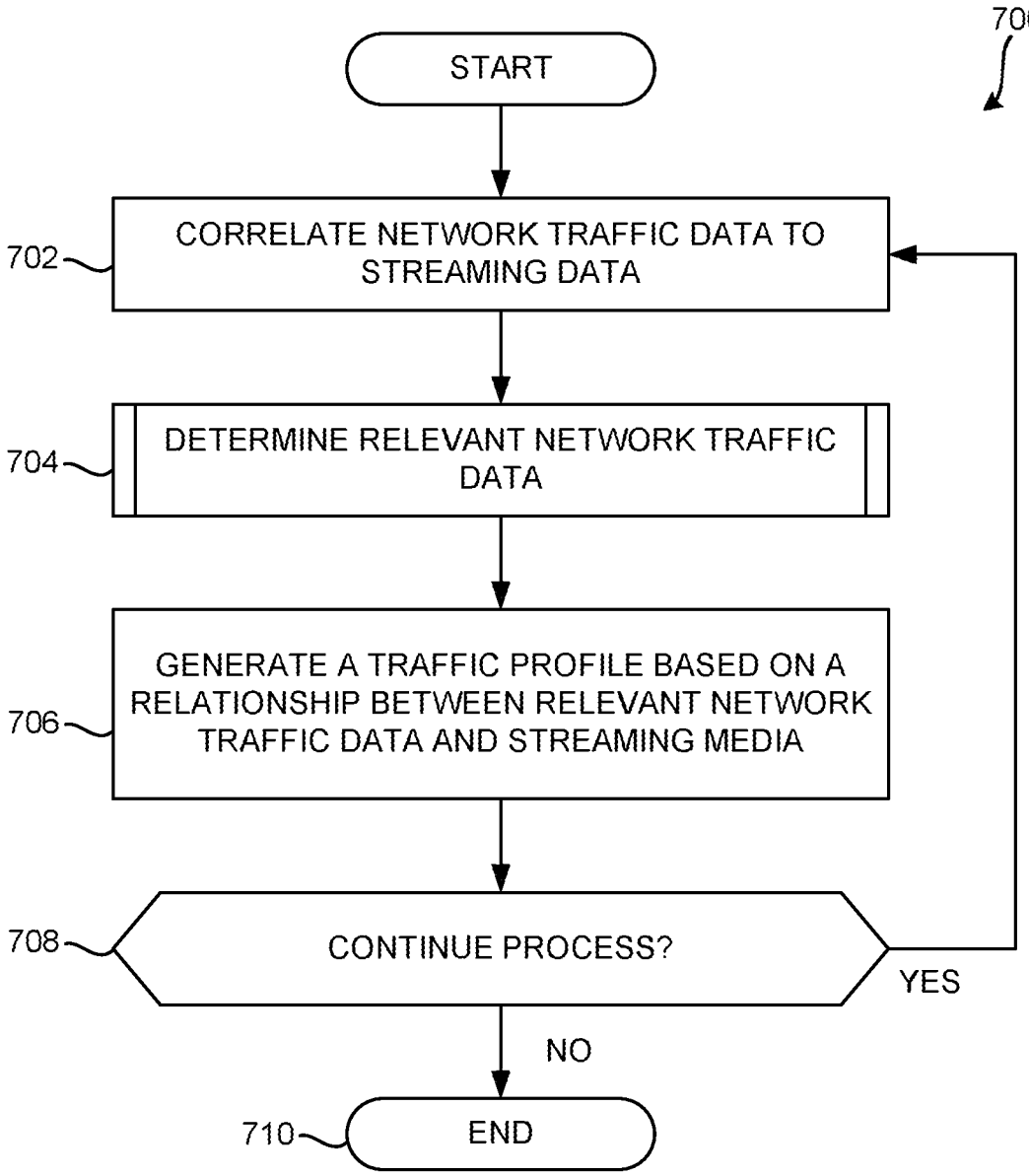

700
START
CORRELATE NETWORK TRAFFIC DATA TO STREAMING DATA
702
DETERMINE RELEVANT NETWORK TRAFFIC DATA
704
GENERATE A TRAFFIC PROFILE BASED ON A RELATIONSHIP BETWEEN RELEVANT NETWORK TRAFFIC DATA AND STREAMING MEDIA
706
CONTINUE PROCESS?
708
YES
NO
END
710

FIG. 7

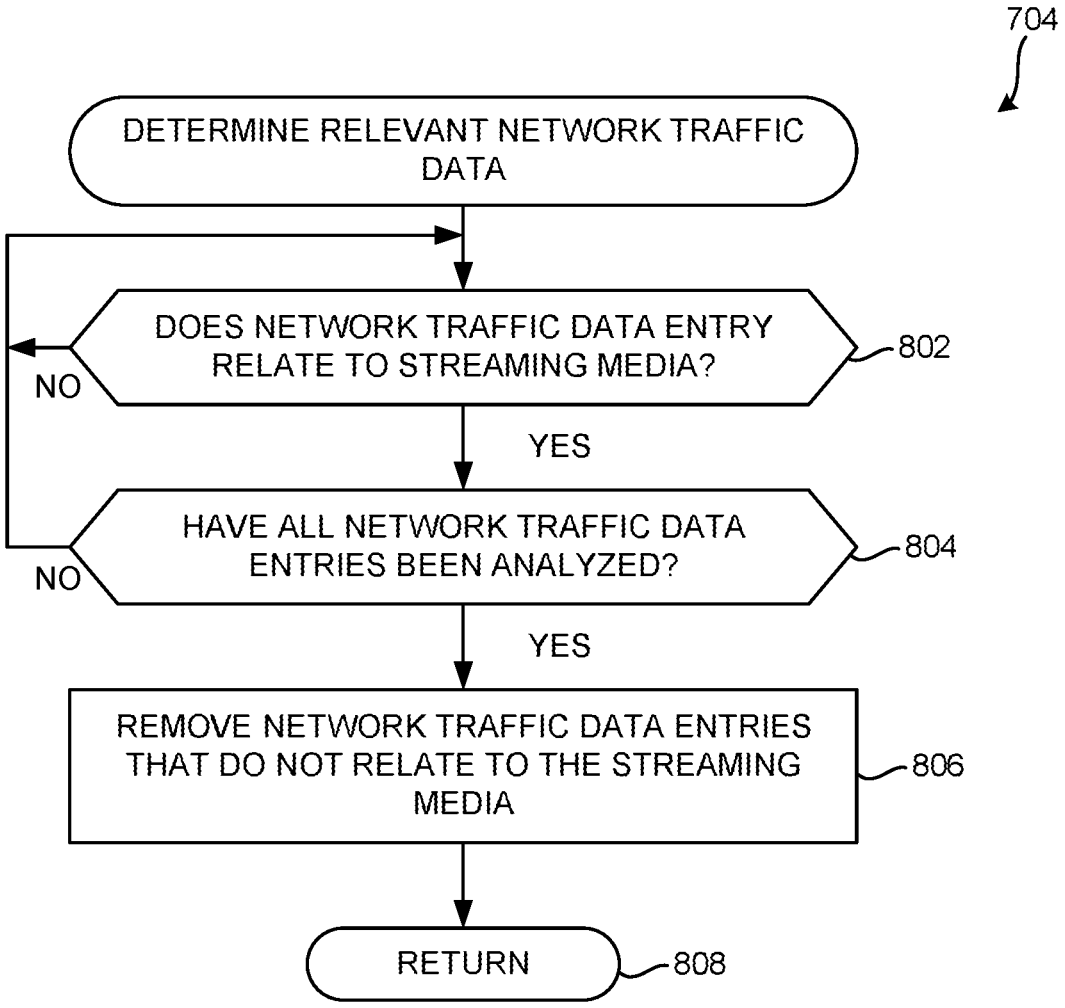

704
DETERMINE RELEVANT NETWORK TRAFFIC DATA
DOES NETWORK TRAFFIC DATA ENTRY RELATE TO STREAMING MEDIA?
802
NO
YES
HAVE ALL NETWORK TRAFFIC DATA ENTRIES BEEN ANALYZED?
804
NO
YES
REMOVE NETWORK TRAFFIC DATA ENTRIES THAT DO NOT RELATE TO THE STREAMING MEDIA
806
RETURN
808

FIG. 8

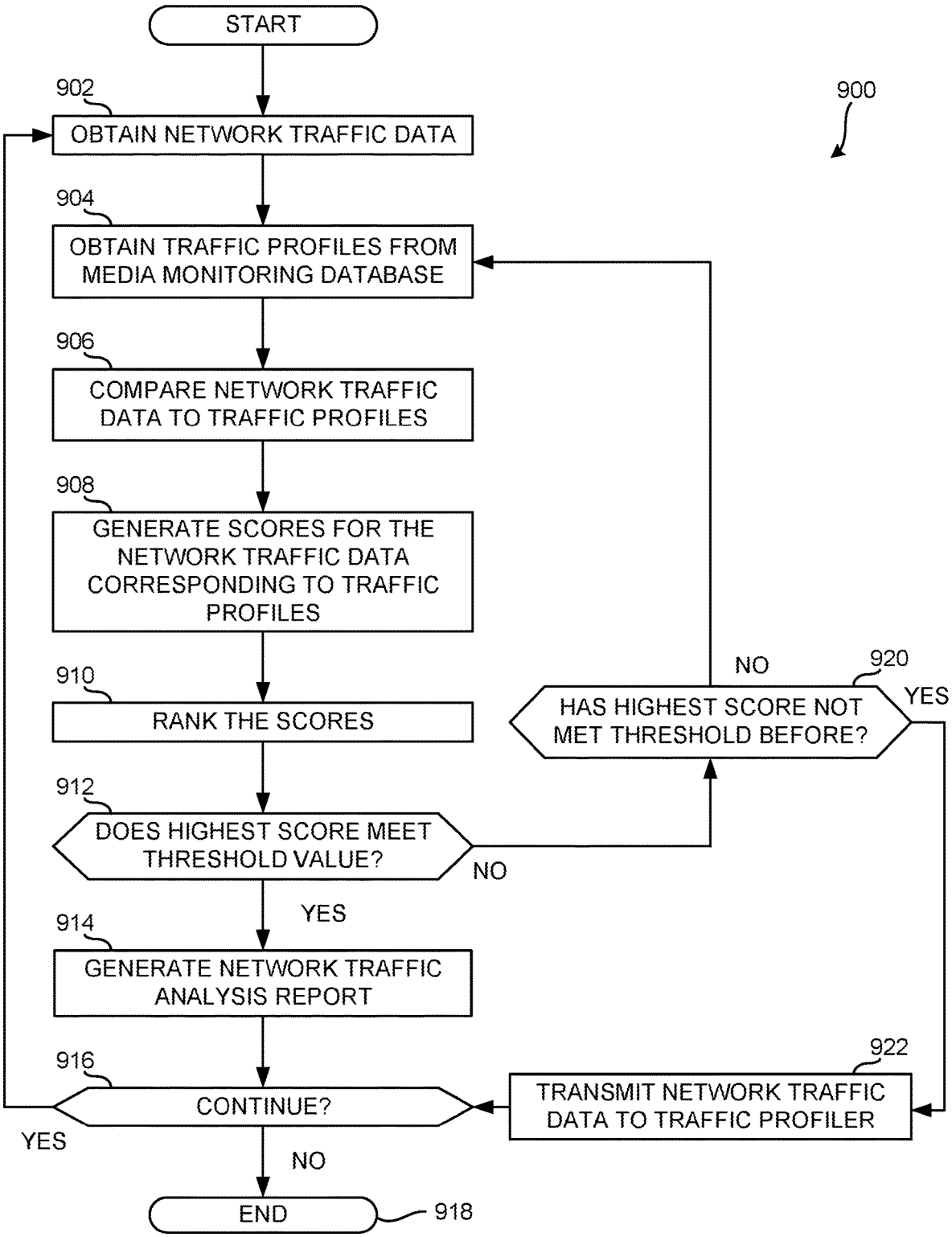

START
900
902
OBTAIN NETWORK TRAFFIC DATA
904
OBTAIN TRAFFIC PROFILES FROM MEDIA MONITORING DATABASE
906
COMPARE NETWORK TRAFFIC DATA TO TRAFFIC PROFILES
908
GENERATE SCORES FOR THE NETWORK TRAFFIC DATA CORRESPONDING TO TRAFFIC PROFILES
910
RANK THE SCORES
912
DOES HIGHEST SCORE MEET THRESHOLD VALUE?
NO
YES
914
GENERATE NETWORK TRAFFIC ANALYSIS REPORT
916
CONTINUE?
YES
NO
END
918
920
HAS HIGHEST SCORE NOT MET THRESHOLD BEFORE?
NO
YES
922
TRANSMIT NETWORK TRAFFIC DATA TO TRAFFIC PROFILER

FIG. 9

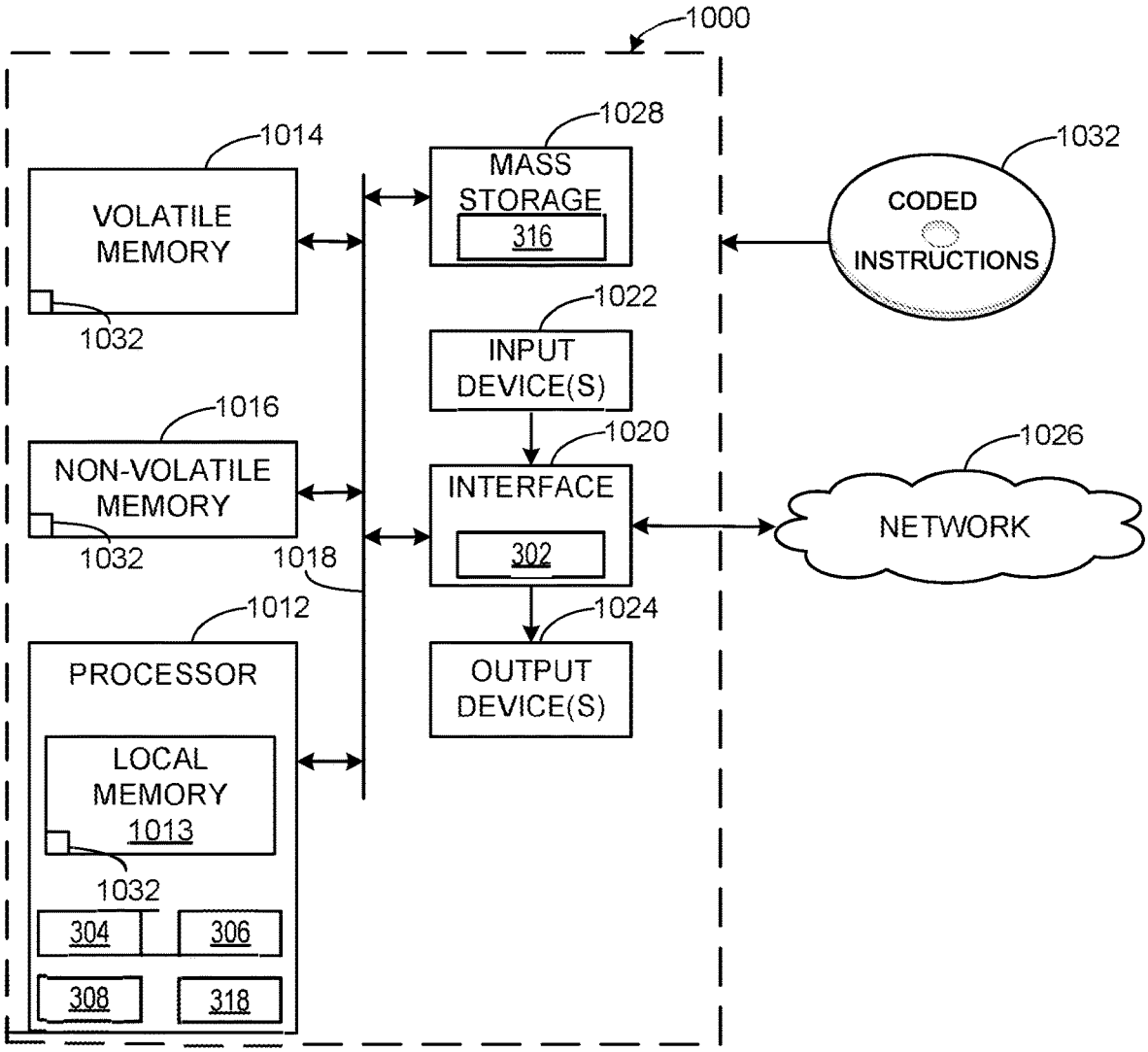

1000
1014
VOLATILE MEMORY
1032
1028
MASS STORAGE
316
1032
CODED INSTRUCTIONS
1022
INPUT DEVICE(S)
1016
NON-VOLATILE MEMORY
1032
1020
INTERFACE
302
1026
NETWORK
1018
1012
PROCESSOR
1024
OUTPUT DEVICE(S)
LOCAL MEMORY
1013
1032
304
306
308
318

FIG. 10

METHODS AND APPARATUS TO IDENTIFY MEDIA PRESENTATIONS BY ANALYZING NETWORK TRAFFIC

CROSS-REFERENCE TO RELATED APPLICATIONS

The present disclosure is a continuation of U.S. patent application Ser. No. 17/959,060 (now U.S. Pat. No. 11,877,028), which was filed on Oct. 3, 2022, which is a continuation of U.S. patent application Ser. No. 17/068,533 (now U.S. Pat. No. 11,463,770), which was filed on Oct. 12, 2020, which is a continuation of U.S. patent application Ser. No. 16/209,897 (now U.S. Pat. No. 10,805,690), which was filed on Dec. 4, 2018, each of which is hereby incorporated herein in its entirety.

FIELD OF THE DISCLOSURE

This disclosure relates generally to media monitoring, and, more particularly, to methods and apparatus to identify media presentations by analyzing network traffic.

BACKGROUND

In recent years, methods of accessing media have evolved. For example, Internet media was primarily accessed via computer systems such as desktop and laptop computers. Recently, the advent of smart devices (e.g. televisions (TVs), smartphones, and streaming devices such as Roku®, Amazon Fire™ TV Stick, Google Chromecast™, Amazon Fire TV Cube, etc.) has allowed access to Internet media in ways that were previously unavailable. As used herein, the term "media" includes any type of content and/or advertisement delivered via any type of distribution medium. Thus, media includes television programming or advertisements, radio programming or advertisements, movies, web sites, streaming media, etc.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a block diagram of an example environment in which an example network meter monitors network traffic data and an example media presentation device meter monitors streaming media.

FIG. **2** is a block diagram of an example environment in which an example network meter monitors network traffic data.

FIG. **3** is a block diagram of an example implementation of the central facility of FIGS. **1** and/or **2**.

FIG. **4** is an illustration of example traffic profile that has been generated from the example environment of FIG. **2**.

FIG. **5** is a flowchart representative of example machine readable instructions which may be executed to implement media presentation device meter of FIG. **1**.

FIG. **6** is a flowchart representative of example machine readable instructions which may be executed to implement the network meter of FIGS. **1** and **2**.

FIG. **7** is a flowchart representative of example machine readable instructions which may be executed to implement the central facility of FIG. **3**.

FIG. **8** is a flowchart representative of example machine readable instructions which may be executed to implement the central facility of FIG. **7**.

FIG. **9** is a flowchart representative of example machine readable instructions which may be executed to implement the example network traffic analyzer of FIG. **3**.

FIG. **10** is a block diagram of an example processing platform structured to execute the instructions of FIGS. **7**, **8** and **9** to implement the central facility of FIG. **1** and/or FIG. **3**.

The figures are not to scale. In general, the same reference numbers will be used throughout the drawing(s) and accompanying written description to refer to the same or like parts.

DETAILED DESCRIPTION

Example methods, apparatus, and articles of manufacture disclosed herein monitor media presentations at media presentation devices. Such media presentation devices may include, for example, Internet-enabled televisions, personal computers, Internet-enabled mobile handsets (e.g., a smartphone), tablet computers (e.g., an iPad®), etc. In some examples, media may be streamed to the media presentation devices from streaming devices. Such streaming devices may include, for example, video game consoles (e.g., Xbox®, PlayStation®), digital media players (e.g., a Roku media player, a Slingbox®, etc.), etc. In some examples, media monitoring information is aggregated to determine ownership and/or usage statistics of media presentation devices, relative rankings of usage and/or ownership of media presentation devices, types of uses of media presentation devices (e.g., whether a device is used for browsing the Internet, streaming media from the Internet, etc.), and/or other types of media presentation device information.

In examples disclosed herein, monitoring information includes, but is not limited to, media identifying information (e.g., media-identifying metadata, codes, signatures, watermarks, and/or other information that may be used to identify presented media), application usage information (e.g., an identifier of an application, a time and/or duration of use of the application, a rating of the application, etc.), and/or user-identifying information (e.g., demographic information, a user identifier, a panelist identifier, a username, etc.).

Audio watermarking is a technique used to identify media such as television broadcasts, radio broadcasts, advertisements (television and/or radio), downloaded media, streaming media, prepackaged media, etc. Existing audio watermarking techniques identify media by embedding one or more audio codes (e.g., one or more watermarks), such as media identifying information and/or an identifier that may be mapped to media identifying information, into an audio and/or video component. In some examples, the audio or video component is selected to have a signal characteristic sufficient to hide the watermark. As used herein, the terms "code" or "watermark" are used interchangeably and are defined to mean any identification information (e.g., an identifier) that may be inserted or embedded in the audio or video of media (e.g., a program or advertisement) for the purpose of identifying the media or for another purpose such as tuning (e.g., a packet identifying header). As used herein "media" refers to audio and/or visual (still or moving) content and/or advertisements. To identify watermarked media, the watermark(s) are extracted and used to access a table of reference watermarks that are mapped to media identifying information.

Unlike media monitoring techniques based on codes and/or watermarks included with and/or embedded in the monitored media, fingerprint or signature-based media monitoring techniques generally use one or more inherent characteristics of the monitored media during a monitoring time interval to generate a substantially unique proxy for the media. Such a proxy is referred to as a signature or fingerprint, and can take any form (e.g., a series of digital values,

a waveform, etc.) representative of any aspect(s) of the media signal(s)(e.g., the audio and/or video signals forming the media presentation being monitored). A signature may be a series of signatures collected in series over a timer interval. A good signature is repeatable when processing the same media presentation, but is unique relative to other (e.g., different) presentations of other (e.g., different) media. Accordingly, the term "fingerprint" and "signature" are used interchangeably herein and are defined herein to mean a proxy for identifying media that is generated from one or more inherent characteristics of the media.

Signature-based media monitoring generally involves determining (e.g., generating and/or collecting) signature(s) representative of a media signal (e.g., an audio signal and/or a video signal) output by a monitored media device and comparing the monitored signature(s) to one or more references signatures corresponding to known (e.g., reference) media sources. Various comparison criteria, such as a cross-correlation value, a Hamming distance, etc., can be evaluated to determine whether a monitored signature matches a particular reference signature. When a match between the monitored signature and one of the reference signatures is found, the monitored media can be identified as corresponding to the particular reference media represented by the reference signature that matched with the monitored signature. Because attributes, such as an identifier of the media, a presentation time, a broadcast channel, etc., are collected for the reference signature, these attributes may then be associated with the monitored media whose monitored signature matched the reference signature. Example systems for identifying media based on codes and/or signatures are long known and were first disclosed in Thomas, U.S. Pat. No. 5,481,294, which is hereby incorporated by reference in its entirety.

In recent years, the use of media services (e.g. Netflix™, Hulu™, Prime Video™, HBO GO™, Showtime™, etc.) has moved from almost exclusively on desktop and laptop computers to a wide variety of media presentation devices. Currently, such media services may be accessed through many devices including televisions, smartphones, and streaming devices including Roku, Amazon Fire TV Stick, Google Chromecast, Amazon Fire TV Cube, etc. As used herein, the term streaming refers to media transmitting directly to a streaming device and the streaming device sending media to a media presentation device.

Typically, media monitoring services would monitor the media streamed to desktop and laptop computers by monitoring the media presentation devices to which the media was being sent. This was fairly simple because there existed direct connectivity between the monitoring device and the media presentation devices. For example, a network meter monitored a router in a household and the media streaming through the router. This allowed for a relatively simple method of monitoring the media streaming to the laptop or desktop computer because the media monitoring service needed only monitor the network traffic data, such as the uniform resource locator (URL) for the media being presented or the Internet Protocol (IP) address for the media presentation device to which the media was sent. Furthermore, the network traffic data included data packets which were not encrypted and could be used to determine the type of media streaming to the media presentation device.

With the advent of new methods of streaming (e.g. Roku, Amazon Fire TV Stick, Google Chromecast, Amazon Fire TV Cube, etc.), such network traffic data may not clearly represent the media that is streaming. For example, the network traffic data that is accessible by a network meter is generally encrypted with only a few metrics that are not encrypted. These unencrypted metrics do not accurately represent what data is being transferred over the network. For example, a streaming service, such as Netflix may use content delivery networks, such as Akamai® or Level 3®. In such an example, a streaming device may request media to stream to a media presentation device. The media that is sent to the streaming device may not be clearly represented by unencrypted metrics of the network traffic data. Because of this unclarity, the network traffic data that is collected by the network meter cannot be used to determine if media is streaming on a media presentation device connected to the network. When the streaming device receives the streaming media from a network device such as a router, and sends it to a media presentation device, it may be unclear whether the media is being presented at all. For example, a Roku stick or a Roku box may connect to the Internet and access media. The media is streamed from a network device (e.g. a router) to the Roku stick or the Roku box. The Roku device is communicatively coupled to a media presentation device (e.g., a television (TV)). The Roku device then renders the media to the TV via a media presentation port such as a High Definition Multimedia Interface port (HDMI port). In this example, because the streaming device (e.g., the Roku device) receives the streaming media via a content delivery network, the unencrypted network traffic data does not clearly represent the streaming media (e.g., Netflix) and cannot be used to determine if media is streaming.

Alternatively, a streaming device may send media to a media presentation device via a wireless connection. In this case, the same issue presents itself when trying to identify whether media is streaming based on captured network traffic data.

Other ways in which media may be streamed to a media presentation device include situations in which a streaming device receives media from a network device such as a router. In this example, the streaming device may be a media presentation device, such as a smart phone or a tablet. The smart phone or tablet may then send the media, which it is presenting on itself, to an additional media presentation device such as a television, desktop computer, laptop computer, any other digital display, projector, etc. This is a process commonly referred to as "screen mirroring." Because the media is first being streamed to the smart phone or tablet, the streaming data representing the media being streamed to the additional media presentation device may not be reflective of the media itself. In this example, the media streaming to the additional media presentation device generates a large amount of network traffic data that may be confusing to a media monitoring service when attempting to identify that media is streaming. This excess network traffic data may be characterized as "noise" that presents additional problems when determining whether media is streaming. The term "noise" is used herein to describe interference between network traffic data that is not of interest and network traffic data that is of interest when attempting to use the network traffic data of interest.

These new methods of accessing media on media presentation devices present a problem for media monitoring services. Because the media is sent to streaming devices via network communications that are mostly encrypted, network meters cannot determine the streaming media without the addition of a supplemental meter. Traditionally, a media presentation device meter is used to supplement the network meter in order to identify the media streaming to the media presentation device. With the multiple sources of data, it is possible to identify the streaming media being presented on

the media presentation device. However, in presentation environments without supplemental meters, it is not possible to identify the streaming media being presented on the media presentation device.

Prior methods of identifying streaming media being presented on a media presentation device using a network meter required the use of multiple meters to identify the streaming media. In situations where only a network meter is present, prior methods cannot determine the streaming media being presented on the media presentation device because the collected network traffic data does not provide enough information to identify the media. The collected network traffic data alone could represent a number of different tasks being done on a network. For example, a media presentation device may be presenting streaming media being streamed to it. This may be represented in the network traffic data as URLs related to a streaming service. However, with this information alone, a media monitoring service cannot distinguish whether the media presentation device is actually presenting streaming media. Additional media presentation devices such as smartphones, tablets, or computers, may be presenting the streaming media and the collected network traffic data does not clearly represent which media presentation device is presenting the streaming media or whether the streaming media is actually being presented rather than a process related to a streaming media application running the background on a media presentation device.

Examples disclosed herein include correlating first network traffic data collected by a network meter to streaming data collected by a media presentation device meter; determining second network traffic data that pertains to streaming media streaming on a streaming device, the second network traffic data based on the first network traffic data; and generating a traffic profile based on a relationship between the second network traffic data and the streaming media streaming on a streaming device.

FIG. **1** is a block diagram of an example environment **100** in which an example network meter monitors network traffic data and an example media presentation device meter monitors streaming data. The example environment **100** includes an example media exposure measurement location **102**, an example wireless communication system **116**, an example network **114**, and an example central facility **118**. The example media exposure measurement location **102** includes an example network device **104**, and example network meter **106**, and example media presentation device **108**, and example media presentation device meter **110**, and an example streaming device **112**. The network **114** is communicatively coupled to the wireless communication system **116** and devices in the media exposure measurement location **102**. The central facility **118** is communicatively coupled to the network **114**. The wireless communication system **116** is communicatively coupled to the network **114** and devices in media exposure measurement location **102**. The wireless communication system **116** is communicatively coupled to devices in the media exposure measurement location by an example network meter communication link **120** and example media presentation device meter communication link **122**.

The media exposure measurement location **102** of the illustrated example of FIG. **1** is a panelist household. However, the media exposure measurement location **102** may be any other location, such as, for example an Internet café, an office, an airport, a library, a non-panelist household, etc. While in the illustrated example a single media exposure measurement location **102** is shown, any number and/or type(s) of media exposure measurement locations may be used.

The panelist household may include one or more panelists. The panelists are users registered on panels maintained by a ratings entity (e.g., an audience measurement company) that owns and/or operates the ratings entity subsystem. Traditionally, audience measurement entities (also referred to herein as "ratings entities") determine demographic reach for advertising and media programming based on registered panel members. That is, an audience measurement entity enrolls people that consent to being monitored into a panel. During enrollment, the audience measurement entity receives demographic information from the enrolling people so that subsequent correlations may be made between advertisement/media exposure to those panelists and different demographic markets.

People (e.g., households, organizations, etc.) register as panelists via, for example, a user interface presented on a media device (e.g., via a website). People may be recruited as panelists in additional or alternative manners such as, for example, via a telephone interview, by completing an online survey, etc. Additionally or alternatively, people may be contacted and/or enlisted to join a panel using any desired methodology (e.g., random selection, statistical selection, phone solicitations, Internet advertisements, surveys, advertisements in shopping malls, product packaging, etc.).

Returning to the illustrated example of FIG. **1**, the media exposure measurement location **102** includes the network device **104**, the network meter **106**, the media presentation device **108**, the media presentation device meter **110**, and the streaming device **112**. The network device **104** is communicatively coupled to a plurality of devices in the media exposure measurement location **102**. For example, the network device **104** is communicatively coupled to the network meter **106** and the streaming device **112**. The example network meter **106** is communicatively coupled to the network device **104**, the media presentation device meter **110**. The network meter **106** is also communicatively coupled to the wireless communication system **116** by the network meter communication link **120**. The media presentation device meter **110** is communicatively coupled to the media presentation device **108** and the network meter **106**. The media presentation device meter **110** is also communicatively coupled to the wireless communication system **116**. The media presentation device meter **110** is communicatively coupled to the wireless communication system **116** by the example media presentation device meter communication link **122**. The streaming device **112** is communicatively coupled to the media presentation device **108** and the network device **104**. The media presentation device is communicatively coupled to the streaming device **112** and the media presentation device meter **110**.

The network device **104** of the illustrated example of FIG. **1** is a router that enables the media devices in the media exposure measurement location **102** to communicate with the network **114** (e.g., the Internet.) In some examples, the network **114** may be implemented using any suitable wired and/or wireless network(s) including, for example, one or more data busses, one or more Local Area Networks (LANs), one or more wireless LANs, one or more cellular networks, one or more private networks, one or more public networks, etc. The example network **114** enables the example network device **104** to be in communication with the example central facility **118**. As used herein, the phrase "in communication," including variances therefore, encompasses direct communication and/or indirect communication

through one or more intermediary components and does not require direct physical (e.g., wired) communication and/or constant communication, but rather includes selective communication at periodic or aperiodic intervals, as well as one-time messages. In some examples, the example network device **104** includes gateway functionality such as modem capabilities. In some other examples, the example network device **104** is implemented in two or more devices (e.g., a router, a modem, a switch, a firewall, etc.).

The network meter **106** of the illustrated example of FIG. **1** is a device that monitors the network traffic data flowing through the network device **104**. In some examples, the network meter **106** may be a single home unit and may have the functionality to collect network traffic data streaming on the network device **104**. The network meter **106** may also be configured to communicate with other devices in the media exposure measurement location **102** such as, for example, the media presentation device meter **110** and the streaming device **112**. The network meter **106** may configured to collect additional network traffic data related to the type of media being streamed to the media presentation device **108** after receiving the notification from the media presentation device **108**. The network meter **106** may also be configured to query devices in the media exposure measurement location **102** to determine information on active processes running on the other devices in the media exposure measurement location **102**. For example, the example network meter **106** of FIG. **1** queries the streaming device **112** to determine the active application running on the streaming device **112**. The example network meter **106** is configured to communicate with the central facility **118** via the network device **104**. The network meter **106** may transmit the network traffic data and the information determined in querying the other devices in the media exposure measurement location **102** to the central facility **118**.

As used herein, the term "network traffic data" includes a variety of metrics of a network device and/or network traffic including Internet Protocol (IP) addresses, URLs, domain names, Multipurpose Internet Mail Extension (MIME) types, bandwidth, duration of events, count of events, etc. Duration of events may refer to the amount of time that a session between a host device (e.g. a router, the network device **104**) and a client device (e.g. the streaming device **112**) exists. Count of event may refer to the number of communications between a client device and a host device to maintain the session.

The media presentation device **108** of the illustrated example of FIG. **1** is a device that may receive any type of media and present the media. The media presentation device **108** may be, for example, an Internet-enabled television, a personal computer, an Internet-enabled mobile handset (e.g., a smartphone), a tablet computer (e.g., an iPad), etc. The media presentation device **108** may present media sent from the streaming device **112** via a wired or wireless connection to the streaming device **112**, a wired or wireless connection to a media service provider, etc. The media presentation device **108** may present the media streaming to it from the streaming device **112** with supplementary media presentation devices such as speakers, projectors, additional screens, etc.

The media presentation device meter **110** of the illustrated example of FIG. **1** is a device which meters the media being presented on the media presentation device **108**. The example media presentation device meter **110** is configured to collect streaming data on the media being streamed to the media presentation device **108**. Streaming data may include, for example, signatures, watermarks, or other metering metrics related to the streaming media on the media presentation device **108**. Additionally, the media presentation device meter **110** may be configured to generate audio signatures and/or video signatures and/or extract audio and/or video watermarks from the audio and video output of the media being presented by the media presentation device **108**. The audio output of the media presentation device **108** may be processed to detect audio codes and/or generate audio signatures for the streaming media. The video output of the media presentation device **108** may be processed to generate video signatures of the streaming media.

In some examples, the media presentation device meter **110** of FIG. **1** may also be configured to detect the streaming device **112** that the media is being streamed from. With the collected and/or generated and/or extracted streaming data, the media presentation device meter **110** may generate a monitoring report including the media being streamed and the identity of the streaming device **112** streaming the media. The media presentation device meter **110** may also be configured to send the monitoring report to the central facility **118** via a connection with the network device **104**. The media presentation device meter **110** may further be configured to communicate with the network meter **106** to transmit a notification from the media presentation device meter **110** to the network meter **106** that may indicate the identity of the streaming device **112** and/or the type of media being streamed by the streaming device **112**. The notification from the media presentation device meter **110** to the network meter **106** may also indicate a variety of other metrics about either the streaming device **112**, the media presentation device **108**, and/or other media presentation devices that may be monitored by media presentation device **108**.

In some examples, the media presentation device meter **110** and the network meter **106** may be unable to transmit information to the central facility **118** via the network meter. For example, a server upstream of the network device **104** may not provide functional routing capabilities to the central facility **118**. In the illustrated example of FIG. **1**, the network meter **106** includes additional capabilities to send information through the wireless communication system **116** (e.g., the cellular communication system) via the network meter communication link **120**. The media presentation device meter **110** includes additional capabilities to send information through the wireless communication system **116** via the media presentation device meter communication link **122**.

The network meter communication link **120** and the media presentation device meter communication link **122** of the illustrated example of FIG. **1** are cellular communication links. However, any other method and/or system of communication may additionally or alternatively be used such as, for example, and Ethernet connection, a Bluetooth connection, a Wi-Fi connection, etc. Further, the network meter communication link **120** and the media presentation device meter communication link **122** of FIG. **1** implement a cellular connection via a Global System for Mobile Communications (GSM). However, any other systems and/or protocols for communication may be used such as, for example, Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA), Worldwide Interoperability for Microwave Access (WiMAX), Long term Evolution (LTE), etc.

The streaming device **112** of the illustrated example of FIG. **1** is a device that retrieves media from a service provider for presentation. In some examples, the streaming device **112** is capable of sending the retrieved media to a media presentation device **108**. The media may be sent via a wired or wireless connection to the media presentation

device **108**. In examples such as these, the streaming device **112** may include digital media players (e.g., a Roku media player, an Amazon Fire TV Stick, a Google Chromecast, Amazon Fire TV Cube, a Slingbox, etc.), video game consoles (e.g., Xbox, PlayStation), etc.

The example central facility **118** of the illustrated example of FIG. **1** is a server that collects and processes media monitoring information from the network meter **106** and the media presentation device meter **110** to generate exposure metrics related to presented media. The central facility **118** analyzes the media monitoring information to identify, for example, traffic profiles for streaming media, which media presentation devices are the most owned, the most-frequently used, the least-frequently owned, the least-frequently used, the most/least-frequently used for particular type(s) and/or genre(s) of media, and/or any other media statistics or aggregate information that may be determined from the data. The media presentation device information may also be correlated or processed with factors such as geodemographic data (e.g., a geographic location of the media exposure measurement location, age(s) of the panelist (s) associated with the media exposure measurement location **102**, an income level of a panelist, etc.) Media presentation device information may be useful to manufacturers and/or advertisers to determine which features should be improved, determine which features are popular among users, identify geodemographic trends with respect to media presentation devices, identify market opportunities, and/or otherwise evaluate their own and/or their competitors' products.

In the illustrated example of FIG. **1**, the central facility **118** may receive and/or obtain Internet messages (e.g., a HyperText Transfer Protocol (HTTP) request(s)) that include the metering information. Additionally or alternatively, any other method(s) to receive and/or obtain metering information may be used such as, for example, an HTTP Secure protocol (HTTPS), a file transfer protocol (FTP), a secure file transfer protocol (SFTP), etc.

In the illustrated example of FIG. **1**, a panelist in the media exposure measurement location **102** may access media via the streaming device **112**. The streaming device **112** connects to the network **114** (e.g. the Internet) via the network device **104** and streams media to the media presentation device **108**. The media presentation device **108** presents the media, for example, the media presentation device **108** presents the media on a display as well as supplemental media presentation devices (e.g. speakers).

The media presentation device meter **110** of FIG. **1** monitors the media presentation device **108** and may collect streaming data such as, for example, watermarks and/or codes and/or signatures for the visual and audio media presented on the media presentation device **108**. For example, the media presentation device meter **110** may generate audio signatures and/or video signatures and/or extract audio and/or video watermarks from the audio and video output of the media being presented by the media presentation device **108**. The audio output of the media presentation device **108** may be processed to detect audio codes and/or generate audio signatures for the streaming media. The video output of the media presentation device **108** may be processed to generate video signatures of the streaming media. Additionally, the media presentation device meter **110** may be configured to detect the streaming device **112** that the media is being streamed from as well as the type of media being streamed by the streaming device **112** and notify the network meter **106**.

The media presentation device meter may also generate a monitoring report based on the collected data that includes the media being streamed and the identity of the streaming device **112** streaming the media. The media presentation device meter **110** may also be configured to send the monitoring report to the central facility **118** via a connection with the network device **104**. If communication with the central facility **118** is obstructed via the network **114**, the media presentation device meter **110** may also send the monitoring report to the central facility **118** via the media presentation device meter communication link **122**. The media presentation device meter **110** may have the functionality to store the collected streaming data and/or the monitoring reports before transmitting the information to the central facility **118**.

The network meter **106** may be configured so that upon receiving the notification from the media presentation device meter **110**, the network meter **106** may collect network traffic data. The network meter **106** may additionally identify, from the notification from the media presentation device meter **110**, the type of media streaming to the media presentation device **108**. After identifying the type of media, the network meter **106** may collect additional network traffic data related to the type of media being streamed to the media presentation device **108**. Additionally, the network meter may identify, from the notification from the media presentation device **108**, the identity of the streaming device **112**. After identifying the streaming device **112**, the network meter **106** may query the streaming device **112** to determine the active application running on the streaming device **112**. After collecting the network traffic data and determining the active application on the streaming device **112** may store the network traffic data, the identity of the streaming device **112**, an identifier for the active application on the streaming device **112**, etc., before transmitting the information to the central facility **118** over the network **114** via the network device **104**. If communication with the central facility **118** is obstructed via the network **114**, the network meter **106** may also send the information to the central facility **118** via the network meter communication link **120**.

After receiving, at the central facility **118**, the streaming data and/or monitoring report from the media presentation device meter **110** and the network traffic data and/or the identifier for the active application on the streaming device **112** and/or the identity of the streaming device **112** from the network meter **106**, the central facility **118** may combine the streaming data and the network traffic data to generate a traffic profile that is representative of the streaming media being presented on the media presentation device **108**.

FIG. **2** is a block diagram of an example environment **200** in which an example network meter **106** monitors network traffic data. The example environment **200** includes an example media exposure measurement location **202**, an example network **114**, an example wireless communication system **116**, and an example central facility **118**. The media exposure measurement location **202** includes an example network device **104**, an example network meter **106**, an example media presentation device **108**, and an example streaming device **112**.

The devices in the media exposure measurement location **202** of FIG. **2** operate in a similar manner as the devices in the media exposure measurement location **102** of FIG. **1**. However, in the media exposure measurement location **202** of FIG. **2**, the media presentation device meter **110** is absent. The absence of the media presentation device meter **110** changes the functional capabilities of monitoring media in the media exposure measurement location **202**. Without the

media presentation device meter **110**, the central facility **118** cannot readily determine the media streaming from the streaming device **112** to the media presentation device **108**. The loss of functionality comes from the fact that the network traffic data that is captured by the network meter **106** is encrypted and, thus, the payloads of the network traffic cannot be examined to determine that the traffic contains media being sent to streaming device **112**.

The streaming device **112** of the illustrated example of FIG. **2** is a device that retrieves media from a service provider for presentation. In some examples, the streaming device **112** is capable of sending the retrieved media to a media presentation device **108**. The media may be sent via a wired or wireless connection to the media presentation device **108**. In examples such as these, the streaming device **112** may include digital media players (e.g., a Roku media player, an Amazon Fire TV Stick, a Google Chromecast, Amazon Fire TV Cube, a Slingbox, etc.), video game consoles (e.g., Xbox, PlayStation), etc.

In the illustrated example of FIG. **2**, the central facility **118** may utilize the traffic profiles generated from at least one media exposure measurement location **102** of FIG. **1** to determine the media being streamed to the media presentation device **108** of the media exposure measurement location **202** of FIG. **2**. With the advent of a traffic profile for media, the central facility may compare the network traffic data captured by the network meter **106** of FIG. **2** with the traffic profile and determine whether the pertinent network traffic data is present in the captured network traffic data to determine whether the media is being presented by the media presentation device **108**.

FIG. **3** is a block diagram of an example implementation of the central facility **118** of FIGS. **1** and/or **2**. The central facility **118** of FIG. **3** includes an example network interface **302**, an example notification extractor **304**, an example media device identifier **306**, an example traffic profiler **308**, an example media monitoring database **316**, and an example network traffic analyzer **318**. The traffic profiler **308** includes an example data correlator **310**, an example network traffic data filter **312**, and an example profile generator **314**. The example network interface **302** is coupled to networks that are exterior to the central facility **118** such as the network **114** of FIGS. **1** and/or **2**. The example network interface **302** is coupled to the network traffic analyzer **318** as well as the notification extractor **304**. The example notification extractor **304** is coupled to the media device identifier **306**. The example media device identifier **306** is coupled to the traffic profiler **308**. The example traffic profiler **308** is coupled to the media monitoring database **316** and the example media monitoring database **316** is coupled to the network traffic analyzer **318**.

The network interface **302** of the illustrated example of FIG. **3** is a device that connects another device (e.g., the central facility **118**) to a network (e.g., the network **114**). The network interface **302** may be implemented as hardware or software. As a hardware the network interface **302** may be electronic circuits that facilitate the communication between a network (e.g., network **114**) and the parts of a computer responsibly for processing the obtained network data (e.g., data from the network **114**). The network traffic interface **302** obtains and/or transmits information to networks that are exterior to the central facility **118** such as the network **114**. The network interface **302** may implement a web server to receive and/or obtain notifications including streaming data and network traffic data from the media presentation device meter **110** and the network meter **106**, respectively. The notifications including the streaming data and/or the network traffic data may be formatted as an HTTP message; however, any other message format and/or protocol may additionally or alternatively be used such as, for example, a file transfer protocol (FTP), a simple message transfer protocol (SMTP), an HTTP secure (HTTPS) protocol, etc.

The notification extractor **304** of the illustrated example of FIG. **3** extracts information from the notifications that are received and/or obtained by the network interface **302**. In some examples, the notification extractor **304** may extract the streaming data and the network traffic data from the notifications. The notification extractor **304** may also extract from the notifications the identity of the streaming device **112** in the media exposure measurement location **102** of FIG. **1** and/or the media exposure measurement location **202** of FIG. **2**, the active application on the streaming device **112**, and other information related to the network traffic data, the streaming data, or the streaming device **112**. If the notification extractor **304** extracts only network traffic data from a media exposure measurement location (e.g., the media exposure measurement location **202**), the notification extractor **304** will send the network traffic data to the network traffic analyzer **318** in order to be analyzed as well as the media device identifier **306** in order to be processed.

The media device identifier **306** of the illustrated example of FIG. **3** identifies the streaming device **112** of FIG. **2**. The example media device identifier **306** utilizes the extracted information from the notification extractor **304** to identify the streaming device **112**. For example, the identity of the streaming device **112**, device manufacturer information, device type information, device operating system information, and/or device media access control (MAC) address information may be used to determine the identity of the streaming device **112**. This information is useful to a media monitoring service and is useful in identifying streaming media using the traffic profile. For example, network traffic data that includes media that is streaming to a streaming device (e.g., the streaming device **112**) may include specific network traffic data that is related to the particular streaming device. Knowing the identity of the streaming device **112** allows the example traffic profiler **308** to profile network traffic data based on the identity of the streaming device **112**.

The example central facility **118** of FIG. **3**, includes the example traffic profiler **308**. The example traffic profiler **308** correlates network traffic data and streaming data from the media presentation device meter **110** of FIG. **1** and the network meter **106** of FIG. **1** and to generate a traffic profile of the pertinent network traffic data that is useful in characterizing specific network traffic data as relating to a presentation of streaming.

The example traffic profiler **308** accesses traffic profiles, network traffic data, streaming data, etc., that is stored in the example media monitoring databases **316** to apply additional correlation and filtering to the traffic profiles for certain streaming media. Additionally, the example traffic profiler **308** receives/obtains network traffic data from the network traffic data analyzer **318** that has been identified as not fitting any of the current traffic profiles of record. The traffic profiler **308** generates a number of robust traffic profiles for a number of streaming media that allow the network traffic analyzer **318** to more accurately analyze information that the central facility **118** receives and/or obtains.

The example traffic profiler **308** includes the data correlator **310**. The data correlator **310** associates the network traffic data with the example streaming data obtained from the media presentation device meter **110** of FIG. **1**. For example, streaming data may include audio and/or visual watermarks and/or signatures and/or codes of the streaming

media with timestamps for when the media started streaming and when the media stopped streaming. In the example, the data correlator **310** associates the entries in the network traffic data with the timestamps in the streaming data. In the example, the data correlator **310** then associates two network traffic data entries with the start time and stop time of the streaming media. The data correlator **310** associates network traffic data entries with the timestamps in the streaming data by ordering the streaming data according to the timestamps of the streaming data and ordering the network traffic data according to the timestamps in the network traffic data. The data correlator **310** then established universal timestamps that corresponds to both the timestamps for the network traffic data and the timestamps for the streaming data. The universal timestamps are based off of the timestamps from the network traffic data and the timestamps from the streaming data. In the example, the data correlator **310** then selects the network traffic data that occurred after the network traffic data entry that corresponds to the start time of the streaming media and the network traffic data entry that corresponds to the stop time of the streaming media. This selected network traffic data is then used by the network traffic data filter **312**.

The example network traffic data filter **312** filters excess network traffic data from the selected network traffic data. For example, there may be several events occurring on the network **114** during the start time and stop time of the streaming media. The example network traffic data filter **312** analyzes the selected network traffic data and determines the network traffic data entries that are related to the streaming media and the network traffic data entries that are not. The example network traffic data filter **312** determines which network traffic data entries are related to the streaming media based on the streaming data collected by the media presentation device meter **110** of FIG. **1**. For example, network traffic data entries that are related to the streaming media include IP addresses, URLs, domain names, MIME types, bandwidth, duration of events, count of events that are representative of the streaming media. For example, if the streaming media is Netflix, an example of a network traffic data entry related to Netflix is a network traffic data entry with a duration of events that is 300 milliseconds, a count of events that is 30,000, and an example URL that is alami.nflx.com. A network traffic data entry that is related to Netflix is a network traffic data entry with a duration of events that is 4 milliseconds, a count of events that is 60, and an example URL that is www.google.com. The example network traffic data filter **312** removes the network traffic data entries that are not related to the streaming media from the selected network traffic data. After removing the network traffic data entries that are not related to the streaming media from the selected network traffic data, the filtered selected network traffic data is used by the example profile generator **314** to generate a traffic profile that is representative of the streaming media.

The example profile generator **314** generates a traffic profile based on the filtered selected network traffic data. The profile generator **314** determines a relationship between the filtered selected network traffic data and the streaming media. The relationship may be a number of pertinent network traffic data entries that occur when a streaming device **112** is streaming media to a media presentation device **108**. The profile generator **314** may additionally be configured to combine a number of profiles in the media monitoring database **316** to form a more comprehensive set of pertinent network traffic data that occurs when a streaming device **112** is streaming media to a media presentation device **108**.

In the illustrated example of FIG. **3**, the central facility **118** includes the media monitoring database **316** to record data (e.g., traffic profiles, network traffic data, streaming data, etc.). In the illustrated example, the example media monitoring database **316** stores data (e.g., traffic profiles, network traffic data, streaming data, etc.) used to identify media being presented on media presentation devices **108**. In some examples, the media monitoring database **316** additionally stores user identifying information and/or demographics such that received and/or obtained device identification information and/or media information can be translated into demographic information. The media monitoring database **316** may be implemented by a volatile memory (e.g., a Synchronous Dynamic Random Access Memory (SDRAM), Dynamic Random Access Memory (DRAM), RAMBUS Dynamic Random Access Memory (RDRAM), etc.) and/or a non-volatile memory (e.g., flash memory). The media monitoring database **316** may additionally or alternatively be implemented by one or more double data rate (DDR) memories, such as DDR, DDR2, DDR3, mobile DDR (mDDR), etc. The media monitoring database **316** may additionally or alternatively be implemented by one or more mass storage devices such as hard disk drive(s), compact disk drive(s) digital versatile disk drive(s), etc. While in the illustrated example media monitoring database **316** is illustrated as a single database, the media monitoring database **316** may be implemented by any number and/or type(s) of databases. Furthermore, the data stored in the media monitoring database **316** may be in any data format such as, for example, binary data, comma delimited data, tab delimited data, structured query language (SQL) structures, etc.

In the illustrated example of FIG. **3**, the example media monitoring database **316** stores data as, for example, flash memory, magnetic media, optical media, etc. Furthermore, the data stored in the media monitoring database **316** may be in any data format such as, for example, binary data, comma delimited data, tab delimited data, structured query language (SQL) structures, etc. In the illustrated example, the example media monitoring database **316** stores metadata (e.g., codes, signatures, etc.) used to identify media. In some examples, the media monitoring database **316** additionally stores user identifying information and/or demographics such that received and/or obtained user identifiers can be translated into demographic information.

The example central facility **118** includes the network traffic analyzer **318** to generate and/or prepare media measurement reports for the network traffic data that the central facility **118** obtains and/or receives. The network traffic analyzer **318** prepares media measurement reports indicative of the exposure of media on media presentation devices. In some examples, the network traffic analyzer **318** generates a report identifying demographics associated with the media via the received and/or obtained network traffic data, streaming data, and other notification information. For example, a network meter **106** at the media exposure measurement location **202** may collect network traffic data. The network traffic analyzer **318** may prepare a report associating the network traffic data with streaming media based on the traffic profiles saved in the media monitoring database **316**. In some instances, the network traffic analyzer **318** generates a report identifying the type of streaming media being presented on the media presentation device **108**. For example, the network traffic analyzer **318** prepares a report associating the obtained network traffic data with the saved traffic profiles. For example, the network traffic analyzer **318**

associates the network traffic data with a media services (e.g. Netflix, Hulu, Amazon Prime Video, HBO GO, Showtime, Starz, etc.).

For example, the network traffic analyzer **318** obtains and/or receives network traffic data from the notification extractor **304**. In the example, the network traffic analyzer **318** obtains and/or receives traffic profiles from the media monitoring database **316**. The example network traffic analyzer **318** compares the network traffic data to the traffic profiles and generates a score for each traffic profile that indicates the level of similarity between the network traffic data and each traffic profile. The example network traffic data analyzer **318** ranks the scores from highest to lowest. In other examples, the network traffic analyzer **318** ranks the scores according to other parameters. If the highest score meets a threshold level of similarity, the network traffic data is categorized as relating to the traffic profile that corresponds to the highest score. However, if the highest score does not meet the threshold level of similarity the network traffic analyzer will re-analyze the network traffic data with new, different, traffic profiles. If the highest score fails to meet the threshold value of similarity more than a predetermined number of times, the network traffic data is sent to the traffic profiler **308** to be profiled into a new traffic profile. A score is determined to have met the threshold level of similarity when the score is within a predetermined distance of the threshold level of similarity.

The example network traffic analyzer **318** generates a report based on the analysis. The network traffic analyzer **318** may present the report on a display, webpage, and/or application interface. By presenting the report generated by the network traffic analyzer **318**, a media monitoring service may use the report to determine how the way in which media is streamed, the frequency of streaming data, and/or other metrics that the network analyzer **318** may include in reports relates to the effectiveness of a media party's media, an advertiser's advertisement, etc.

FIG. **4** is an illustration of an example traffic profile **400** generated by the example traffic profiler **308** of FIG. **3**. The example traffic profile **400** is a preliminary traffic profile for streaming media (e.g. Netflix streaming media) that is generated from the example media exposure measurement location **102**. In the illustrated example, the traffic profile **400** includes an example network traffic data entry **402**, an example media presentation device meter entry **404**, an example network traffic data entry **406**, and an example network traffic data entry **408**. Because the traffic profile **400** was generated from a single media exposure measurement location (e.g. media exposure measurement location **102**), there may not be enough information to determine the network traffic data entries that are related to the streaming media and the network traffic data entries that are not. For example, the example network traffic data entry **402** does not relate to the streaming media. The network traffic data entry **402** includes a duration of 4 milliseconds, a count of 60 communications, and a URL of www.google.com. The network traffic data entry **402** is not related to the streaming media because the duration, the count, and the URL do not meet a set of criteria that is known to relate to the streaming media. For example, a duration the meets the set of known criteria may be a duration that is typically associated with the streaming media. An example duration that is associated with Netflix streaming media, may be, for example, 300 milliseconds. Additionally, an example count that is associated with Netflix streaming media is a count of 28,000. Furthermore, an example URL that is associated with Netflix streaming media is a URL of akami.ntflx.com. Network traffic data entries that are associated with (e.g. related to) a particular type of streaming media are not limited to the examples disclosed herein. Network traffic data entries that are related to a particular type of streaming media may be changed over time to maintain relevance to a particular type of streaming media as the streaming media changes over time.

In the illustrated example of FIG. **4**, the traffic profile **400** includes the example media presentation device meter entry **404**. The example media presentation device meter entry **404** includes an identity of a streaming device **112** of the media exposure measurement location **102**. The media presentation device meter entry **404** may further include streaming data representative of the streaming media.

The example traffic profile **400** includes the example network traffic data entry **406** which is a network traffic data entry representative of the network meter **106** querying devices in the media exposure measurement location **102**. For example, the network meter **106** queries the streaming device **112** and discover that the active application is, for example, the Netflix application. This is useful in the network traffic data because it allows the traffic profiler **308** to determine if the active application corresponds to the captured streaming data. If the active application corresponds to the captured streaming data, the traffic profiler **308** can, for example, utilize the network traffic data filter **312** to filter the network traffic data entries that are not related to the streaming media (e.g. the active application).

The example traffic profile **400** includes the example network traffic data entry **408**. The example network traffic data entry **408** includes a duration of 300, a count of 28,000, and a URL of akami.ntflx.com. The network traffic data entry **408** is an example of a network traffic data entry that is related to the streaming media.

In the illustrated examples, the network traffic data filter **312** uses the traffic profile **400** and additional traffic profiles to filter out excess network traffic data entries that are not related to the streaming media (e.g. network traffic data entry **402**). By filtering out excess network traffic data entries, the traffic profiler **308** generates more refined traffic profiles that are representative of the streaming media. Additionally, the traffic profiler **308**, may utilize supervised machine learning techniques to compare multiple traffic profiles from a variety of media exposure measurement locations to identify the network traffic data entries that are representative of a particular type of streaming media and to filter out excess network traffic data entries. The traffic profiler **308** may also use supervised machine learning techniques to combine traffic profiles that are related to different types of streaming media to develop new traffic profiles that are representative of a combination of streaming media.

While an example manner of implementing the central facility **118** of FIGS. **1** and/or **2** is illustrated in FIG. **3**, one or more of the elements, processes and/or devices illustrated in FIG. **3** may be combined, divided, re-arranged, omitted, eliminated and/or implemented in any other way. Further, the example data correlator **310**, the example network traffic data filter **312**, the example profile generator **314**, the traffic profiler **308** and/or, more generally, the example central facility of FIGS. **1** and/or **2** may be implemented by hardware, software, firmware and/or any combination of hardware, software and/or firmware. Thus, for example, any of the example data correlator **310**, the example network traffic data filter **312**, the profile generator **314**, the traffic profiler **308** and/or, more generally, the example central facility **118** could be implemented by one or more analog or digital circuit(s), logic circuits, programmable processor(s), pro-

grammable controller(s), graphics processing unit(s) (GPU (s)), digital signal processor(s) (DSP(s)), application specific integrated circuit(s) (ASIC(s)), programmable logic device (s) (PLD(s)) and/or field programmable logic device(s) (FPLD(s)). When reading any of the apparatus or system claims of this patent to cover a purely software and/or firmware implementation, at least one of the example data correlator **310**, the example network traffic data filter **312**, the profile generator **314**, and/or the example traffic profiler **308** is/are hereby expressly defined to include a non-transitory computer readable storage device or storage disk such as a memory, a digital versatile disk (DVD), a compact disk (CD), a Blu-ray disk, etc. including the software and/or firmware. Further still, the example central facility **118** of FIGS. **1** and/or **2** may include one or more elements, processes and/or devices in addition to, or instead of, those illustrated in FIG. **3**, and/or may include more than one of any or all of the illustrated elements, processes and devices. As used herein, the phrase "in communication," including variations thereof, encompasses direct communication and/or indirect communication through one or more intermediary components, and does not require direct physical (e.g., wired) communication and/or constant communication, but rather additionally includes selective communication at periodic intervals, scheduled intervals, aperiodic intervals, and/or one-time events.

A flowchart representative of example hardware logic, machine readable instructions, hardware implemented state machines, and/or any combination thereof for implementing the media presentation device meter **110** of FIGS. **1** and/or **2** is shown in FIG. **5**. The machine readable instructions may be an executable program or portion of an executable program for execution by a computer processor. The program may be embodied in software stored on a non-transitory computer readable storage medium such as a CD-ROM, a floppy disk, a hard drive, a DVD, a Blu-ray disk, or a memory associated with the processor, but the entire program and/or parts thereof could alternatively be executed by a device other than the processor and/or embodied in firmware or dedicated hardware. Further, although the example program is described with reference to the flowchart illustrated in FIG. **5**, many other methods of implementing the example media presentation device meter **110** may alternatively be used. For example, the order of execution of the blocks may be changed, and/or some of the blocks described may be changed, eliminated, or combined. Additionally or alternatively, any or all of the blocks may be implemented by one or more hardware circuits (e.g., discrete and/or integrated analog and/or digital circuitry, an FPGA, an ASIC, a comparator, an operational-amplifier (op-amp), a logic circuit, etc.) structured to perform the corresponding operation without executing software or firmware.

FIG. **5** is a flowchart representative of example machine readable instructions which may be executed to implement the example media presentation device meter **110** of FIG. **1**. The program of FIG. **5** begins at block **502** where the media presentation device **110** detects a streaming device streaming media to the media presentation device **108**. The program **500** continues at block **504** where the media presentation device meter **110** collects streaming data based on the streaming media. The streaming data includes, for example, signatures, watermarks, or other metering metrics related to the streaming media on the media presentation device **108**. Additionally, at block **504**, the media presentation device meter **110** generates audio signatures and/or video signatures and/or extract audio and/or video watermarks from the audio and video output of the media being presented by the media presentation device **108**. The audio output of the media presentation device **108** is processed to detect audio codes and/or generate audio signatures for the streaming media. The video output of the media presentation device **108** is processed to generate video signatures of the streaming media.

In the illustrated example of FIG. **5**, the program **500** continues at block **506** where the media presentation device meter **110** notifies the network meter **106** of an identity of a streaming device (e.g., the identity of the streaming device **112**). Next in the program **500**, at block **508**, the media presentation device meter **110** transmits a notification to the central facility **118**. The notification may include the collected streaming data as well as the identity of the streaming device **112**. In the illustrated example, the media presentation device meter **110** is configured to transmit the notification to the central facility **118** via the media presentation device meter communication link **122**, and additionally via the network device **104**. Because of the capability of multiple modes of communication, the media presentation device meter **110** may transmit the collected streaming data to the central facility **118** when there are obstructions to network communication via the network **114**.

At block **510**, the media presentation device meter **110** determines whether to continue monitoring the media presentation device **108** and communicating with the network meter **106** and the central facility **118**. If the media presentation device meter **110** determines that it will continue monitoring the media presentation device **108** and communicating with the network meter **106** and the central facility **118** the program **500** proceeds to block **502**. However, if the media presentation device meter **110** determines that it will not continue monitoring the media presentation device **108** and communicating with the network meter **106** and the central facility **118**, the program **500** ends at block **512**.

A flowchart representative of example hardware logic, machine readable instructions, hardware implemented state machines, and/or any combination thereof for implementing the network meter **106** of FIGS. **1** and/or **2** is shown in FIG. **6**. The machine readable instructions may be an executable program or portion of an executable program for execution by a computer processor. The program may be embodied in software stored on a non-transitory computer readable storage medium such as a CD-ROM, a floppy disk, a hard drive, a DVD, a Blu-ray disk, or a memory associated with the processor, but the entire program and/or parts thereof could alternatively be executed by a device other than the processor and/or embodied in firmware or dedicated hardware. Further, although the example program is described with reference to the flowchart illustrated in FIG. **6**, many other methods of implementing the example network meter **106** may alternatively be used. For example, the order of execution of the blocks may be changed, and/or some of the blocks described may be changed, eliminated, or combined. Additionally or alternatively, any or all of the blocks may be implemented by one or more hardware circuits (e.g., discrete and/or integrated analog and/or digital circuitry, an FPGA, an ASIC, a comparator, an operational-amplifier (op-amp), a logic circuit, etc.) structured to perform the corresponding operation without executing software or firmware.

FIG. **6** is a flowchart representative of example machine readable instructions which may be executed to implement the network meter of FIGS. **1** and **2**. The program **600** of FIG. **6** begins at block **602** where the example network meter **106** collects network traffic data. The network traffic

data includes, for example, IP addresses, URLs, domain names, MIME types, bandwidth, duration of events, count of events, etc.

The program **600** continues at block **604** where the network meter **106** monitors a network (e.g. the network **114**) for a notification of an identity of a streaming device (e.g. streaming device **112**). If the notification is not received and/or obtained, the program **600** continues to block **602**. However, if the notification is received and/or obtained, the program **600** continues to block **606** where the network meter **106** initiates a device discovery process. The example device discovery process of block **606** causes the network meter **106** to query devices in the media exposure measurement location **102** to determine information on active processes running on the other devices in the media exposure measurement location **102**. For example, the network meter **106** queries the streaming device **112** to determine the active application running on the streaming device **112**.

Next, the program **600** of the illustrated example of FIG. **6** continues to block **608** where the network meter **106** transmits the collected network traffic data to the central facility **118**. In the illustrated example, the network meter **106** is configured to transmit the collected network traffic data to the central facility **118** via the network meter communication link **120**, and additionally via the network device **104**. Because of the capability of multiple modes of communication, the network meter **106** may transmit the collected network traffic data to the central facility **118** when there are obstructions to network communication via the network **114**. After the network meter **106** transmits the network traffic data to the central facility **118**, the program **600** continues to block **610**.

At block **610**, the network meter **106** determines whether to continue monitoring the network device **104** and communicating with the media presentation device meter **110** and the central facility **118**. If the network meter **106** determines that it will continue monitoring the network device **104** and communicating with the media presentation device meter **110** and the central facility **118** the program **600** proceeds to block **602**. However, if the network meter **106** determines that it will not continue monitoring the network device **104** and communicating with the media presentation device meter **110** and the central facility **118**, the program **600** ends at block **612**.

Flowcharts representative of example hardware logic, machine readable instructions, hardware implemented state machines, and/or any combination thereof for implementing the central facility **118** of FIGS. **1**, **2**, and/or **3** are shown in FIGS. **7**, **8**, and **9**. The machine readable instructions may be an executable program or portion of an executable program for execution by a computer processor such as the processor **1012** shown in the example processor platform **1000** discussed below in connection with FIG. **10**. The program may be embodied in software stored on a non-transitory computer readable storage medium such as a CD-ROM, a floppy disk, a hard drive, a DVD, a Blu-ray disk, or a memory associated with the processor **1012**, but the entire program and/or parts thereof could alternatively be executed by a device other than the processor **1012** and/or embodied in firmware or dedicated hardware. Further, although the example program is described with reference to the flowchart illustrated in FIGS. **7**, **8**, and **9**, many other methods of implementing the example central facility **118** may alternatively be used. For example, the order of execution of the blocks may be changed, and/or some of the blocks described may be changed, eliminated, or combined. Additionally or alternatively, any or all of the blocks may be implemented by one or more hardware circuits (e.g., discrete and/or integrated analog and/or digital circuitry, an FPGA, an ASIC, a comparator, an operational-amplifier (op-amp), a logic circuit, etc.) structured to perform the corresponding operation without executing software or firmware.

FIG. **7** is a flowchart representative of example machine readable instructions which may be executed to implement the traffic profiler **308** of FIG. **3**. The program **700** begins at block **702** where the traffic profiler **308** utilizes the data correlator **310** to correlate the collected network traffic data and the captured streaming data. The data correlator **310** correlates the network traffic data and the streaming data by associating the network traffic data with the duration of the streaming media that is included in the streaming data. For example, the streaming data includes timestamps at each entry of streaming data. The data correlator **310** may determine the start time and stop time of a particular streaming media. Additionally, the network data includes, for example, timestamps at each network traffic data entry. The data correlator **310** associates the network data with timestamps between the start time and stop time of the streaming media as specified by the streaming data.

The program **700** continues to block **704** where the network traffic data filter **312** determines the network traffic data that is relevant to the streaming media. For example, the network traffic data filter **312** filters excess network traffic data that does not relate to the streaming data. Next, the program **700** continues at block **706** where the profile generator **314** generates a traffic profile. The traffic profile is, for example, the traffic profile **400** of FIG. **4**. The example profile generator **314** generates the traffic profile **400** based on a relationship between the relevant network traffic data and the streaming media. The relationship between the relevant network traffic data and the streaming media is based on the correlation between pertinent network traffic data and the streaming media. In other words, the example traffic profile **400** is based on a relationship between the network traffic data that is relevant and pertinent to the streaming media. The relationship is defined so that the network data that is categorized as pertinent to the streaming media may be used to determine whether other network traffic data from a different media exposure measurement location (e.g. media exposure measurement location **202**) corresponds to a particular type of streaming data.

Next, the program **700** continues to block **708** where the traffic profiler **308** determines whether to continue the program or not. If the program is to continue, the program **700** continues to block **502** of the program **500** of FIG. **5**. If, however, the program is to stop, the program **700** continues to block **710** where it ends.

FIG. **8** is a flowchart representative of example machine readable instructions which may be executed to implement block **704** of FIG. **7**. The program begins at block **802** where the example network traffic data filter **312** determines whether the network traffic data from the media exposure measurement location **102** relates to the streaming media from the media exposure measurement location **102**. The network traffic data filter **312** compares the network traffic data entries with the streaming data. The network traffic filter **312** determines whether each particular network traffic data entry relates to the streaming media by comparing the information in the network traffic data entries to the information from the streaming data such as watermarks, signatures, etc. If the network traffic data filter **312** determines that a network traffic data entry is not related to the streaming media, the network traffic data filter **312** marks or otherwise denotes the particular network traffic data entry as

not related to the streaming media and proceeds to analyze the next network traffic data entry. If, however, the network traffic data filter **312** determines that the network traffic data entry does relate to the streaming media, the network traffic data filter **312** marks or otherwise denotes the particular network traffic data entry as related to the streaming media and proceeds to block **804**.

At block **804**, the example network traffic data filter **312** determines whether all the network traffic data entries have been analyzed. If the network traffic data filter **312** determines that all the network traffic data entries have not been analyzed, the network traffic data filter **312** proceeds to block **802**, otherwise, the network traffic data filter **312** proceeds to block **806**.

At block **806**, the example network traffic data filter **312** removes the network traffic data entries that do not relate to the streaming media from the selected network traffic data. The network traffic data entries that are removed may be compared to other network traffic data from different media exposure measurement location to quickly identify network traffic data entries that are not related to the streaming media at the media exposure measurement location. At block **808**, the network traffic data filter **312** returns to the program **700** and continues to block **706**.

FIG. **9** is a flowchart representative of example machine readable instructions which may be executed to implement the example network traffic analyzer **318** of FIG. **3**. The program **900** begins at block **902** where the example network traffic analyzer **318** obtains network traffic data from the notification extractor **304**. At block **904**, the example network traffic analyzer **318** obtains traffic profiles from the media monitoring database **316**.

At block **906**, the example network traffic analyzer **318** compares the network traffic data to the data profiles. At block **908** the example network traffic analyzer **318** generates a score for each traffic profile that corresponds to the similarity between the network traffic data and the traffic profile. At block **910** the example network traffic analyzer **318** ranks the scores.

At block **912**, the example network traffic analyzer **318** determines if the highest ranked score meets a threshold value for similarity. If the highest ranked score does not meet the threshold value for similarity, the example network traffic analyzer **318** determines, at block **920**, if the network traffic data being analyzed has had the highest ranked score not meet the threshold value of similarity before. If the highest ranked score has not met the threshold value of similarity before, the network traffic analyzer **312** proceeds to block **902**. However, if the highest ranked score has met the threshold value of similarity before, the example network traffic analyzer **318** transmits, at block **922**, the network traffic data to the traffic profiler **308** for further analysis. The network traffic analyzer **318** proceeds to block **916**.

Returning to block **912**, if the network traffic analyzer **318** determines that the highest ranked score meets the threshold value of similarity, the example network traffic analyzer **318** generates, at block **914**, a network traffic analysis report identifying the type of streaming media being presented on the media presentation device **108**. For example, the network traffic analyzer **318** prepares a report associating the obtained network traffic data with the saved traffic profiles. For example, the network traffic analyzer **318** associates the network traffic data with a media services (e.g. Netflix, Hulu, Amazon Prime Video, HBO GO, Showtime, Starz, etc.).

The network traffic analyzer **318** may present the report on a display, webpage, and/or application interface. By presenting the report generated by the network traffic analyzer **318**, a media monitoring service may use the report to determine how the way in which media is streamed, the frequency of streaming data, and/or other metrics that the network analyzer **318** may include in reports relates to the effectiveness of a media party's media, an advertiser's advertisement, etc.

The example network traffic analyzer **318** determines, at block **916**, whether to continue the program **900**. If the network traffic analyzer **318** determines to continue the program **900**, the network traffic analyzer **318** proceeds to block **902**. If, however, the network traffic analyzer **318** determines not to continue the program **900**, the network traffic analyzer **318** proceeds to block **918** where the program **900** ends. As mentioned above, the example processes of FIGS. **5**, **6**, **7**, **8**, and **9** may be implemented using executable instructions (e.g., computer and/or machine readable instructions) stored on a non-transitory computer and/or machine readable medium such as a hard disk drive, a flash memory, a read-only memory, a compact disk, a digital versatile disk, a cache, a random-access memory and/or any other storage device or storage disk in which information is stored for any duration (e.g., for extended time periods, permanently, for brief instances, for temporarily buffering, and/or for caching of the information). As used herein, the term non-transitory computer readable medium is expressly defined to include any type of computer readable storage device and/or storage disk and to exclude propagating signals and to exclude transmission media.

"Including" and "comprising" (and all forms and tenses thereof) are used herein to be open ended terms. Thus, whenever a claim employs any form of "include" or "comprise" (e.g., comprises, includes, comprising, including, having, etc.) as a preamble or within a claim recitation of any kind, it is to be understood that additional elements, terms, etc. may be present without falling outside the scope of the corresponding claim or recitation. As used herein, when the phrase "at least" is used as the transition term in, for example, a preamble of a claim, it is open-ended in the same manner as the term "comprising" and "including" are open ended. The term "and/or" when used, for example, in a form such as A, B, and/or C refers to any combination or subset of A, B, C such as (1) A alone, (2) B alone, (3) C alone, (4) A with B, (5) A with C, (6) B with C, and (7) A with B and with C. As used herein in the context of describing structures, components, items, objects and/or things, the phrase "at least one of A and B" is intended to refer to implementations including any of (1) at least one A, (2) at least one B, and (3) at least one of A and at least one of B. Similarly, as used herein in the context of describing structures, components, items, objects and/or things, the phrase "at least one of A or B" is intended to refer to implementations including any of (1) at least one A, (2) at least one B, and (3) at least one A and at least one B. As used herein in the context of describing the performance or execution of processes, instructions, actions, activities and/or steps, the phrase "at least one of A and B" is intended to refer to implementations including any of (1) at least A, (2) at least B, and (3) at least A and at least B. Similarly, as used herein in the context of describing the performance or execution of processes, instructions, actions, activities and/or steps, the phrase "at least one of A or B" is intended to refer to implementations including any of (1) at least A, (2) at least B, and (3) at least A and at least B.

FIG. **10** is a block diagram of an example processor platform **1000** structured to execute the instructions of FIGS. **7**, **8**, and **9** to implement the apparatus of FIG. **3**. The

processor platform **1000** can be, for example, a server, a personal computer, a workstation, a self-learning machine (e.g., a neural network), a mobile device (e.g., a cell phone, a smart phone, a tablet such as an iPad), a personal digital assistant (PDA), an Internet appliance, a DVD player, a CD player, a digital video recorder, a Blu-ray player, a gaming console, a personal video recorder, a set top box, a headset or other wearable device, or any other type of computing device.

The processor platform **1000** of the illustrated example includes a processor **1012**. The processor **1012** of the illustrated example is hardware. For example, the processor **1012** can be implemented by one or more integrated circuits, logic circuits, microprocessors, GPUs, DSPs, or controllers from any desired family or manufacturer. The hardware processor may be a semiconductor based (e.g., silicon based) device. In this example, the processor implements the notification extractor **304**, the media device identifier **306**, the traffic profiler **308**, the network traffic analyzer **318** of FIG. **3**.

The processor **1012** of the illustrated example includes a local memory **1013** (e.g., a cache). The processor **1012** of the illustrated example is in communication with a main memory including a volatile memory **1014** and a non-volatile memory **1016** via a bus **1018**. The volatile memory **1014** may be implemented by Synchronous Dynamic Random Access Memory (SDRAM), Dynamic Random Access Memory (DRAM), RAMBUS® Dynamic Random Access Memory (RDRAM®) and/or any other type of random access memory device. The non-volatile memory **1016** may be implemented by flash memory and/or any other desired type of memory device. Access to the main memory **1014**, **1016** is controlled by a memory controller.

The processor platform **1000** of the illustrated example also includes an interface circuit **1020**. The interface circuit **1020** may be implemented by any type of interface standard, such as an Ethernet interface, a universal serial bus (USB), a Bluetooth® interface, a near field communication (NFC) interface, and/or a PCI express interface. In this example, the interface **1020** includes the network interface **302** of FIG. **3**.

In the illustrated example, one or more input devices **1022** are connected to the interface circuit **1020**. The input device(s) **1022** permit(s) a user to enter data and/or commands into the processor **1012**. The input device(s) can be implemented by, for example, an audio sensor, a microphone, a camera (still or video), a keyboard, a button, a mouse, a touchscreen, a track-pad, a trackball, isopoint and/or a voice recognition system.

One or more output devices **1024** are also connected to the interface circuit **1020** of the illustrated example. The output devices **1024** can be implemented, for example, by display devices (e.g., a light emitting diode (LED), an organic light emitting diode (OLED), a liquid crystal display (LCD), a cathode ray tube display (CRT), an in-place switching (IPS) display, a touchscreen, etc.), a tactile output device, a printer and/or speaker. The interface circuit **1020** of the illustrated example, thus, typically includes a graphics driver card, a graphics driver chip and/or a graphics driver processor.

The interface circuit **1020** of the illustrated example also includes a communication device such as a transmitter, a receiver, a transceiver, a modem, a residential gateway, a wireless access point, and/or a network interface to facilitate exchange of data with external machines (e.g., computing devices of any kind) via a network **1026**. The communication can be via, for example, an Ethernet connection, a digital subscriber line (DSL) connection, a telephone line connection, a coaxial cable system, a satellite system, a line-of-site wireless system, a cellular telephone system, etc.

The processor platform **1000** of the illustrated example also includes one or more mass storage devices **1028** for storing software and/or data. Examples of such mass storage devices **1028** include floppy disk drives, hard drive disks, compact disk drives, Blu-ray disk drives, redundant array of independent disks (RAID) systems, and digital versatile disk (DVD) drives. In the illustrated example of FIG. **10** the mass storage device **1028** includes one or more media monitoring databases **316**.

The machine executable instructions **1032** of FIG. **7** may be stored in the mass storage device **1028**, in the volatile memory **1014**, in the non-volatile memory **1016**, and/or on a removable non-transitory computer readable storage medium such as a CD or DVD.

From the foregoing, it will be appreciated that example methods, apparatus and articles of manufacture have been disclosed that generate traffic profiles that may be used to identify streaming media being presented on a media presentation device when only a network meter is available. Traffic profiles include network traffic data entries that relate to a particular type of streaming media being presented on a media presentation device. Example methods, apparatus, and articles of manufacture disclosed herein allow for a media monitoring service to combine multiple traffic profiles to generate more refined traffic profiles according to particular media. Generating a more refined traffic profile according to particular media allows for media monitoring services to identify media streaming to a media presentation device in environments with only network metering. The disclosed methods, apparatus and articles of manufacture improve the efficiency of using a computing device by generating a traffic profile that reduces the computational intensity of determining a particular type of media by providing a traffic profile to which collected network traffic data can be compared to identify a particular media being presented on a media presentation device. Without a traffic profile to which collected network traffic data can be compared, a computer must process streaming data and analyze the collected network traffic data in view of the streaming data in order to determine the particular media being presented on a media presentation device. Furthermore, the disclosed methods, apparatus, and articles of manufacture disclosed herein eliminate the need for media presentation device meters to determine particular media being presented on a media presentation device. In other words, the disclosed methods, apparatus, and articles of manufacture disclosed herein reduce the computational and processing burden of media presentation device meters by eliminating the need for media presentation device meters. The disclosed methods, apparatus and articles of manufacture are accordingly directed to one or more improvement(s) in the functioning of a computer.

Although certain example methods, apparatus and articles of manufacture have been disclosed herein, the scope of coverage of this patent is not limited thereto. On the contrary, this patent covers all methods, apparatus and articles of manufacture fairly falling within the scope of the claims of this patent.

What is claimed is:

1. A network meter for monitoring network traffic at a media exposure measurement location, the media exposure measurement location comprising a streaming device, the network meter, and a router separate from the network meter, wherein the streaming device, the network meter, and

the router are connected to a local area network of the media exposure measurement location, the network meter comprising:

a processor; and

memory having stored thereon machine-readable instructions that, when executed by the processor, cause performance of operations comprising:

monitoring the local area network to identify the streaming device on the local area network, wherein the streaming device is accessing media from the Internet and providing the media to a television for presentation;

based on identifying the streaming device, querying the streaming device to determine an active streaming application that is associated with a streaming service and running on the streaming device; and

storing an identifier of the active streaming application.

2. The network meter of claim **1**, the operations further comprising:

transmitting the identifier of the active streaming application via the Internet to a server located remotely from the media exposure measurement location.

3. The network meter of claim **1**, wherein the television is a smart television.

4. The network meter of claim **1**, wherein the streaming device is connected to, and separate from, the television.

5. The network meter of claim **1**, wherein the streaming device is configured to receive the media from the router.

6. The network meter of claim **1**, wherein the media exposure measurement location comprises a panelist household monitored by an audience measurement entity.

7. The network meter of claim **1**, the operations further comprising:

collecting, on the local area network, network traffic data comprising one or more of a domain name for the streaming service or a uniform resource locator (URL) for the streaming service.

8. The network meter of claim **7**, the operations further comprising:

based on the network traffic data, determining a duration of a session during which the active streaming application is running.

9. The network meter of claim **7**, the operations further comprising:

transmitting the network traffic data via the Internet to a server located remotely from the media exposure measurement location.

10. The network meter of claim **9**, wherein the server is configured to identify the media being provided to the television for presentation based on (i) the identifier of the active streaming application and (ii) one or more of the domain name for the streaming service or a uniform resource locator (URL) for the streaming service.

11. The network meter of claim **1**, the operations further comprising:

receiving a message indicating a device type of the streaming device.

12. A non-transitory computer-readable storage medium, having stored thereon machine-readable instructions that, when executed by a processor of a network meter, cause performance of operations, wherein the network meter is configured for monitoring network traffic at a media exposure measurement location, and wherein the media exposure measurement location comprises a streaming device, the network meter, and a router separate from the network meter, wherein the streaming device the network meter, and the router are connected to a local area network of the media exposure measurement location, the operations comprising:

monitoring the local area network to identify the streaming device on the local area network, wherein the streaming device is accessing media from the Internet and providing the media to a television for presentation;

based on identifying the streaming device querying the streaming device to determine an active streaming application that is associated with a streaming service and running on the streaming device; and

storing an identifier of the active streaming application.

13. The non-transitory computer-readable storage medium of claim **12**, the operations further comprising:

transmitting the identifier of the active streaming application via the Internet to a server located remotely from the media exposure measurement location.

14. The non-transitory computer-readable storage medium of claim **12**, wherein the streaming device is connected to, and separate from, the television.

15. The non-transitory computer-readable storage medium of claim **12**, wherein the streaming device is configured to receive the media from the router.

16. The non-transitory computer-readable storage medium of claim **12**, wherein the media exposure measurement location comprises a panelist household monitored by an audience measurement entity.

17. A method for monitoring network traffic at a media exposure measurement location, wherein the method performed is by a network meter, wherein the network meter comprises a processor, and wherein the media exposure measurement location comprises a streaming device, the network meter, and a router separate from the network meter, wherein the streaming device, the network meter, and the router are connected to a local area network of the media exposure measurement location, the method comprising:

monitoring the local area network to identify the streaming device on the local area network, wherein the streaming device is accessing media from the Internet and providing the media to a television for presentation;

based on identifying the streaming device, querying the streaming device to determine an active streaming application that is associated with a streaming service and running on the streaming device; and

storing an identifier of the active streaming application.

18. The method of claim **17**, further comprising:

transmitting the identifier of the active streaming application via the Internet to a server located remotely from the media exposure measurement location.

19. The method of claim **17**, wherein:

the streaming device is connected to, and separate from, the television, and

the streaming device is configured to receive the media from the router.

20. The method of claim **17**, wherein the media exposure measurement location comprises a panelist household monitored by an audience measurement entity.

21. A network meter for monitoring network traffic at a media exposure measurement location, the media exposure measurement location comprising a television, the network meter, and a router separate from the network meter, wherein the television, the network meter, and the router are connected to a local area network of the media exposure measurement location, the network meter comprising:

a processor; and

memory having stored thereon machine-readable instructions that, when executed by the processor, cause performance of operations comprising:

monitoring the local area network to identify the television on the local area network, wherein the television is accessing media from the Internet and presenting the media;

based on identifying the television, querying the television to determine an active streaming application that is associated with a streaming service and running on the television; and

transmitting an identifier of the active streaming application via the Internet to a server located remotely from the media exposure measurement location.

22. The network meter of claim **21**, the operations further comprising:

collecting, on the local area network, network traffic data comprising one or more of a domain name for the streaming service or a uniform resource locator (URL) for the streaming service.

* * * * *

EXHIBIT 2

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

THE NIELSEN COMPANY (US), LLC, Plaintiff, v. TVISION INSIGHTS, INC., Defendant.	)))))))))	C.A. No. _____ **JURY TRIAL DEMANDED**

DECLARATION OF VIRGINIA LEE

I, Virginia Lee, declare as follows:

INTRODUCTION AND ENGAGEMENT

1. I have been retained on behalf of The Nielsen Company (US), LLC ("Nielsen") to offer technical opinions relating to United States Patent No. 12,047,642 ("the '642 Patent" or "the Asserted Patent").

2. I have no financial interest in either party to, or in the outcome of, the above-styled proceeding. I am being compensated for my work as an expert on an hourly basis at my standard consulting rate. My compensation is not dependent on the outcome of these proceedings or the content of my opinions.

PERSON OF ORDINARY SKILL IN THE ART

3. In my opinion, a person of ordinary skill in the art ("POSA") in the field of the Asserted Patent would have a working knowledge of the software and/or hardware of audience measurement and tracking systems. The POSA would have gained this knowledge through an undergraduate degree in an applicable engineering field (for example, electrical or computer

engineering or computer science) and at least three years of work experience in relevant fields or through a graduate degree in an applicable engineering field.

MY EXPERTISE

4. My CV, attached to this declaration as Exhibit A, demonstrates my expertise in the field of the Asserted Patent. In particular, I have a bachelor's degree in Engineering Science, which is a multi-discipline, five-year undergraduate degree encompassing Computer Science, Electrical Engineering, and Mathematics. I also have over a decade of relevant work experience in the field. During that time, I led and took part in multiple design projects for enhancements to TV audience measurement systems, TV program collection and verification systems, and TV/online advertising measurement systems.

INFORMATION CONSIDERED

5. I have reviewed the Asserted Patent. Counsel has informed me that I should consider the Asserted Patent through the lens of one skilled in the art of the field of the Asserted Patent at the time of the priority date of the patent, and I have done so.

6. For the Asserted Patent, I have assumed the priority date is the date of the ultimate parent. However, my analysis would not change if the priority date were deemed to be another date close to the filing date of the application.

7. My analyses are based on my education and work experience, in addition to my investigation and study of materials of the Asserted Patent.

THE ASSERTED PATENT

8. The '642 Patent relates to, among other things, methods and apparatuses for media monitoring, and, more particularly, to methods and apparatus to identify active streaming applications by analyzing network traffic and querying streaming devices. *See* Ex. 1, '642 Patent,

1:20-22; 7:23-27. The ‘642 patent improves media monitoring technology by analyzing network traffic such that when it determines a streaming device is providing Internet content to a viewer, it queries the streaming device for the identity of the streaming application running on that streaming device. It then stores an identification of that streaming application.

9. In the prior art, “media monitoring services would monitor the media streamed to desktop and laptop computers by monitoring the media presentation devices to which the media was being sent. This was fairly simple because there existed direct connectivity between the monitoring device and the media presentation devices. For example, a network meter monitored a router in a household and the media streaming through the router. This allowed for a relatively simple method of monitoring the media streaming to the laptop or desktop computer because the media monitoring service needed only monitor the network traffic data, such as the uniform resource locator (URL) for the media being presented or the Internet Protocol (IP) address for the media presentation device to which the media was sent.” Ex. 1, ‘642 Patent, 3:46-59.

10. As media delivery and network technology evolved, new problems arose in monitoring media streaming. Networks started encrypting traffic, which prevented the prior art techniques from providing robust monitoring. “With the advent of new methods of streaming (e.g. Roku, Amazon Fire TV Stick, Google Chromecast, Amazon Fire TV Cube, etc.), such network traffic data may not clearly represent the media that is streaming. For example, the network traffic data that is accessible by a network meter is generally encrypted with only a few metrics that are not encrypted. These unencrypted metrics do not accurately represent what data is being transferred over the network. For example, a streaming service, such as Netflix may use content delivery networks, such as Akamai® or Level 3®. In such an example, a streaming device may request media to stream to a media presentation device. The media that is sent to the

streaming device may not be clearly represented by unencrypted metrics of the network traffic data. Because of this unclarity, the network traffic data that is collected by the network meter cannot be used to determine if media is streaming on a media presentation device connected to the network. When the streaming device receives the streaming media from a network device such as a router, and sends it to a media presentation device, it may be unclear whether the media is being presented at all." Ex. 1, '642 Patent, 3:63-4:16.

11. As the '642 patent explains, "[t]hese new methods of accessing media on media presentation devices present a problem for media monitoring services. Because the media is sent to streaming devices via network communications that are mostly encrypted, network meters cannot determine the streaming media without the addition of a supplemental meter. Traditionally, a media presentation device meter is used to supplement the network meter in order to identify the media streaming to the media presentation device. With the multiple sources of data, it is possible to identify the streaming media being presented on the media presentation device." Ex. 1, '642 Patent, 4:58-5:1. In this context, "a media presentation device meter" identifies content as it is presented on the television or other presentation device.

12. According to the '642 patent, prior attempts to solve these problems did not result in acceptable metering data. "Prior methods of identifying streaming media being presented on a media presentation device using a network meter required the use of multiple meters to identify the streaming media. In situations where only a network meter is present, prior methods cannot determine the streaming media being presented on the media presentation device because the collected network traffic data does not provide enough information to identify the media. The collected network traffic data alone could represent a number of different tasks being done on a network." Ex. 1, '642 Patent, 5:5-14.

13. The '642 patent solves these problems with an innovative network-based technological solution. In the invention, "the network meter may identify, from the notification from the media presentation device 108, the identity of the streaming device 112. After identifying the streaming device 112, the network meter 106 may query the streaming device 112 to determine the active application running on the streaming device 112." Ex. 1, '642 Patent, 10:25-30; *also* 7:23-29 ("The network meter 106 may also be configured to query devices in the media exposure measurement location 102 to determine information on active processes running on the other devices in the media exposure measurement location 102. For example, the example network meter 106 of FIG. 1 queries the streaming device 112 to determine the active application running on the streaming device 112."). Querying the streaming device allows the meter to determine "that the active application is, for example, the Netflix application." Ex. 1, '642 Patent, 16:20-21; *also* 19:4-18 ("The program 600 continues at block 604 where the network meter 106 monitors a network (e.g. the network 114) for a notification of an identity of a streaming device (e.g. streaming device 112). If the notification is not received and/or obtained, the program 600 continues to block 602. However, if the notification is received and/or obtained, the program 600 continues to block 606 where the network meter 106 initiates a device discovery process. The example device discovery process of block 606 causes the network meter 106 to query devices in the media exposure measurement location 102 to determine information on active processes running on the other devices in the media exposure measurement location 102. For example, the network meter 106 queries the streaming device 112 to determine the active application running on the streaming device 112.").

14. The priority date of the '642 Patent is at least as early as December 4, 2018, which is the filing date of the ultimate parent application from which the '642 Patent is a continuation. *See* Ex. 1, '642 Patent.

15. As of that date, it was not well-understood, routine, or conventional among those of skill in the art to monitor streaming media and active applications on a streaming device by querying a streaming device. In particular, it was not well-understood, routine, or conventional to query a streaming device for information about the application active and running on the device. At that time, those of skill in the art were focused on analyzing data either from the presentation device/television or from the network to obtain information about media consumption and active, running applications.

16. As of the priority date, the state of the art attempted to determine the application executing on a streaming device by network traffic analysis, by using a monitor running on the device itself, or by monitoring content as the television or other presentation device played it. As explained in the '642 patent, network traffic analysis does not provide identifying information about the running application because, among other things, the use of content delivery networks such as Level 3 or Akamai may hide the source of the media. *See* Ex. 1, '642 patent, 4:2-13. In addition, network traffic analysis has trouble determining media identity and the running application because such traffic is generally encrypted. *See* Ex. 1, '642 patent, 3:63-4:13 ("Because of this unclarity, the network traffic data that is collected by the network meter cannot be used to determine if media is streaming on a media presentation device connected to the network.").

17. In addition to a network-based solution, monitoring could occur on the device itself, *i.e.*, a device-based solution. But such a solution requires cooperation with device

manufacturers to obtain such data. Moreover, such manufacturers may not wish to share data and may prefer to monetize it themselves, resulting in a fragmented media measurement landscape.

18. Monitoring could also occur at the television or other presentation device. This technology, however, will not identify the active application on a streaming device unless the detected content is available only on a single streaming service. Such monitoring does not identify the application presenting the media content; rather, it monitors only the content itself. Some media content, for example, is available on streaming services and is also available in syndication on linear television stations, such as those available over the air or on cable television. For such content, monitoring the presentation device will not identify either that the content is being streamed or the active application.

19. The invention provides a technical improvement in the technology of media measurement by identifying a solution to these problems: monitoring the network for a streaming device accessing internet-based media, querying the streaming device for the executing application, and then recording that data for later analysis.

20. The ‘642 patent claims are directed to using a specific, technical technique to determine the active, running application—querying the streaming device after determining that such a device is accessing media from the Internet and providing the media to a television.

21. Other ways of determining the active, running application would have been known to one of skill in the art. For example, a network meter could require streaming devices to operate only in a non-encrypted environment where it could track the destination of the received and sent packets and thereby determine the running application. For example, packets sent to and received from an IP address associated with Netflix would indicate that the Netflix application is running on the streaming device. Alternatively, a network monitor could try to obtain clues from

encrypted data to make an educated guess as to the running application, such as by analyzing patterns in the sent and received packets. Or the running application could be monitored on the device itself. Consequently, the claims do not preempt all ways of identifying an application active on a streaming device.

22. These technical alternatives have disadvantages compared to the invention. Many devices will not operate in an unencrypted environment for security reasons, and device manufacturers may be unwilling to create unencrypted and thus unsecure products or modes. In any event, communications between a streaming device and a content delivery network will obscure the application running on the streaming device even if the communications are unencrypted. And while some information might be gleaned from encrypted data, encryption seeks to obscure the encrypted content, making it hard to obtain useful data from encrypted data streams. Trying to glean useful information from patterns in the transmission and reception of data might also not work in the long or medium term if the streaming device's send/receive protocols change or are not predictable. And monitoring on the device leaves monitoring in the hands of the device manufacturers who might not be willing to share data with a media measurement entity and who are not a neutral party with respect to the usage of their own devices.

23. The invention avoids these problems by monitoring the network and when it determines that the streaming device is accessing Internet media, querying the streaming device for the active streaming application running on the device. This technical improvement in the art of media measurement and networking solves the problems previously described with these alternatives.

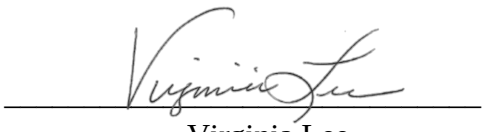
24. The ‘642 Patent reflects the invention’s improvements in the technical area of audience measurement by claiming specific improvements to computer-based systems used by an audience measurement entity to obtain information about streaming device usage. The claims’ focus is to improve computer functionality in audience measurement technology itself, not on economic or other tasks for which a computer is used in its ordinary capacity or as a mere tool. The claims therefore recite a computer system and method for producing a certain result in a certain way—querying a streaming device after monitoring the network to identify the streaming device and determining it is accessing internet-based media—and not solely the result or effect produced.

25. The ‘642 patent claims are not directed to using a computer as a tool—that is, automating a conventional idea on a computer. Rather, the claims improve the technical functioning of the computer and computer networks by making a specific improvement to computer functionality by reciting a specific technique for improving media measurement. Specifically, the ‘642 patent claims recite, among other things, identifying a streaming device on the network and querying the streaming device over a network to obtain the running, active application on that streaming device. Nor do the claims recite a fundamental economic or longstanding commercial practice. Rather, the claims solve a technical problem with respect to monitoring media consumption on a network. The claimed solution is rooted in computer technology in order to overcome a problem specifically arising in the realm of computer networks.

CONCLUSION

26. I declare under penalty of perjury that the foregoing statements are true and accurate to the best of my knowledge.

Dated: May 8, 2025



Virginia Lee

EXHIBIT A

ecomp CONSULTANTS
INFORMATION TECHNOLOGY & PATENT LITIGATION
TELECOMMUNICATIONS ▪ INTERNET ▪ EFORENSICS
301 W Platt St, Suite 365, Tampa, FL 33606
vlee@ecompconsultants.com, (813) 334-6719

Virginia Lee has extensive experience in engineering science with a concentration in computer engineering. Ms. Lee has been employed in various industries and as an independent consultant specializing in software product design, product management, and strategic consulting. Ms. Lee has provided consulting services in mobile application solutions, user interface and authentication methods, networked device monitoring and CRM/ERP systems for corporations such as: Nielsen Media, Verizon, United Airlines, ConEd, Dominion, Southwest Gas and Global Crossings. She holds degrees in Engineering and an MBA.

Ms. Lee has been a consulting and testifying expert for cases including patent litigation, trade secret and contract disputes for secure payment systems, cellular data technology and device monitoring.

Professional Experience:

2006 - Present **Expert Consultant**
eComp Consultants ***Tampa, FL***
Provide consulting on design and development of software products and ecommerce technology. Provide technology consulting and expert support for telecommunications, internet, and ecommerce applications in the areas of:

- Patent portfolio evaluation, market valuation, and prior art analysis.
- Patent litigation for telecommunications, internet, gaming, and POS technology patents for validity/invalidity and infringement/non-infringement analysis.
- Software contract due diligence and functional analyses for disputes involving custom software, UI/website design, mobile technologies and ecommerce.
- Standards Team Lead: NIST Cyber Security Working Group for the SmartGrid

2006 - Present **Cyber Security – GRC / AI Tools Team Consultant/Product Owner**
Provide technology leadership and management for several disparate groups as post - merger support, cyber security product certifications and AI development tools.

- Advise/streamline financial reconciliation across global workplace sites
- Serve as Product Owner/Champion for AI tools development for bulk intelligent responses need for a variety of use cases
- Program management for Regulatory Product Certification process

2011 - 2020 **VP, Technology**
Nielsen
Technology Leader focused on delivery of strategic global initiatives for the CIO. Managed development and delivery teams across multiple business units, led the Global Cyber Security team and owned M&A Technology Integration.

- Led M&A Integration for technology and infrastructure teams for Due Diligence, Acquisition Integration and Divestitures. Portfolio included 12-15 active global efforts in various stages of progress and size

- Advised on secure design training for metering team to secure metering devices being deployed globally.
- Adviser to the Audit team for matters involving controls regulated by the Media Ratings Council (MRC)
- Led application development for solutions providing user experience to Nielsen panels and TV, Broadcasting and Syndicated providers.
- Worked closely with Engineering and Operations teams to develop software solutions bridging data ingestion from metering devices to reporting output.
- Managed 35+ direct reports & 50+ contractors (onshore/offshore) in delivery of measurement solutions for TV, Online, and Advertising products.
- Platform owner for 10+ disparate systems serving multiple global business units, including Local and National TV measurement, advertising measurement, and consumer products measurement.

2006 - 2008 **Independent Consultant**

The Nielsen Company ***Oldsmar, FL***

High profile project included as part of enterprise-wide transformation and global convergence initiatives to develop web-based client services.

- Developed, championed and sold strategic business plan to support new opportunities in web-based solutions to TV measurement clients.
- Developed prototypes for customer facing website and web-based functionality for collecting TV programming baselines
- Led usability testing with clients and internal users for client website operations

United Illuminating ***New Haven, CT***

- Project Manager for Outage Management System (OMS) Interface phase of the Mobile Upgrade project. Managed five-person team and vendor representatives in development of requirements, use cases and integration specs for network device management.
- SME/Advisor for Mobility Upgrade project to provide feature and integration analysis, design and testing strategy for SAP and OMS interfaces.

Enspiria Solutions, Inc. ***Denver, CO***

Project Engineer for systems integration services between Data Collection Devices and CRM, Call Center, and SCADA systems; including requirements, design and testing.

ViryaNet, Inc. ***Southborough, MA***

Retained through 2006 as Account Manager for two major utility accounts. Included preparation and presentation of proposals for services and customer liaison.

2004 - 2006 **Solutions Architect/Account Management**

ViryaNet, Inc. ***Southborough, MA***

Provided consulting, pre-sales and account management support for ViryaNet's web-based Mobile Workforce Scheduling and Management System, Service Hub.

- Reviewed client environments to determine product fit to business requirements/ embedded base, defined solution scope and designed product integration of web products into existing client environments.
- Designed and developed browser-based applications for wireless mobile platforms.

2002 - 2004 **Independent Consultant/Self Employed**

United Illuminating **New Haven, CT**

Provided consulting services specific to the integration and business processes associated with the SAP CRM, Mobile Workforce, Outage Management and EDI solutions.

- Reviewed SAP BluePrints, facilitated design sessions between client, SAP and Mobile Workforce vendor
- Developed detailed integration specifications between Mobile Workforce vendor and SAP workflows for Call Center staff
- Participated with the SAP team in performing detailed integration testing of SAP transactions, IDOCs, workflows, and call center user interface, etc.
- Developed detailed specifications for IBM's Websphere Data Interchange for the transformation of IDOCs from/to XML for Mobile Workforce Automation Project
- Project Manager for EDI project to meet State, DPUC and client requirements.

2000 - 2002 **Consultant**

Tanning Technology Corporation

United Airlines **Chicago, IL**

Lead on systems integration, web interface, rules design, testing methodology and application design for multi-phased website implementation for client booking engine, customer profiles, secure authentication and strategic campaign management.

Global Crossings/Global Center **San Jose, CA**

Drove strategic design initiatives for incorporating ecommerce, network infrastructure monitoring and alerts, and change control processes to meet IPO requirements.

Rhythms – DSL provider ***Denver, CO***

Lead on requirements for redesign of provisioning processes to integrate with Price Waterhouse CRM system and meet systems performance guidelines.

Tanning Technology **Chicago, IL**

Product Manager for changing corporate business model to "productize" solutions in the Customer Marketing and Performance Technology areas. Focused on web-based support for industries such as Telecom/Utilities, Media, Logistics and Hospitality.

1996 - 2000 **Product Manager for Mobile Workforce Products**

Utility Partners Inc. ***Tampa, FL***

Provided direction for the development and support of standard product packages for special purpose components, such as: industry-specific and technology specific solutions:

- ISP solutions
- PDA/Wireless connectivity
- Multi-platform eCommerce and web-based technology

Provided consulting and professional services to clients for customization of mobile product functions for specific use, such as: enhanced outage, inspection and maintenance, eCommerce initiatives, GIS and ERP integration. Including Inspection and maintenance systems for monitoring and alerts of network attached devices.

Participated in cross-vendor consortium to design, prototype and present an end-to-end (ERP/CRM<->GIS) standard for call center, outage management and Mobile solutions.

1987 - 1996 **Product Manager / Sr. Advisory Systems Engineer –> Member Technical Staff**

GTE/Verizon ***Dallas, TX / Tampa, FL***

As Product Manager for Commercial Services, prepared full product plans, including:

- functional breakdowns, industry/competitive analysis, business models, distribution, pricing, packaging, staffing, marketing, and five year financial plans

As Systems Engineer, provided technology consulting, including:

- Platform workshops and presentations at International User Groups
- Specialized in call center systems for Customer Marketing Sales and Service, Network Infrastructure, Billing Systems integration, Distributed Systems Support
- Designed and developed EDI/B2B applications for Carrier Access Market and large scale custom CRM system for domestic Telco Call Centers
- Supported Disaster recovery (DRP) and outsourcing services for cellular clients
- Prototype development of human factors standards and workflow environments for GTE's commercial systems' platforms to support eCommerce initiatives and call center workflow for cross sell and up sell of telecom services
- Designed and published OO standards to all Domestic User Groups
- Evaluated data integration and deployment strategy in support of call center automation and CRM implementations
- Designed/developed intelligent agents for online customer access services and eCommerce, call center and CIS applications

1984 - 1987 **Software Engineer**
Paradyne Corporation ***Largo, FL***

Performed design, development, and testing activities for individual projects within telecommunications product group, specifically responsible for:

- TCP/IP communications integration with proprietary networking product
- OSI Session/Data Link protocol development for high-speed telecom product
- Session Error Recovery for OSI Session Layer for high-speed telecom product
- System generation software for high-speed telecommunications product
- Data emulation, capturing and user interface for channel-attached devices

1982 - 1984 **Software Application Designer*OmniData Corporation*** ***Largo, FL***

Performed design, development, testing and operations activities for call center solutions to collect customer data for processing of non-profit marketing materials.

- Designed custom user interfaces for each customer
- Designed custom print formats for each customer
- Supported multiple data entry platforms including micro-processors, PCs and early transportable platforms

Education/Certifications:

GSEC - Cyber Security Certification	2015	SANS Institute
Cyber Security: Critical Security Controls, Cloud and NW Security	2015	SANS Institute
MBA - Executive Master of Business Administration	2014	University of South Florida
BSES - Bachelor of Science in Engineering Science	1992	University of South Florida
	1984	

Speaking/Publications

- Keynote Speaker: SWE Local Annual Meeting
- University of Miami - Annual Commercial Symposium - Technology Career Center
- WITI Special Event Speaker: Cyber Security Essentials - Unit 1
- Business/Technology Analysis & Integration Strategy for ERP System: Surname Electric (EBS)
- Published: NISTR 7628 Guidelines for Smart Grid Cyber Security - Standards Working Group
- Recurring Speaker for eCommerce: US TV Networks – Nielsen Program Guidelines Committee
- Recurring Speaker for emerging eCommerce strategy: Nielsen Strategy and Planning Committee
- Recurring Speaker: Mobile Product Standardization/Workflow: Utility Partners Int'l User's Group
- Recurring Speaker: Client/Server Technology in CRM: GTEDS International User's Conference
- Recurring Speaker: Workflow in CRM Solutions: GTEDS International User's Conference
- Business Process Analysis and Business Plan: Local TV Programming Ops - Nielsen Media
- Program Names Guidelines – eCommerce Rules: Local TV Programming Ops - Nielsen Media
- Integration design for Outage Management and Mobile Data Solutions: United Illuminating
- Training for Workforce Automation and Advanced Scheduling for Field Operations: UI
- User Interface Design and Training Materials for Mobile Workforce Pilot: So Cal Edison
- Interface Design, Testing, & Training for EDI to SAP Integration for Alternate Supplier Initiative: UI
- Integration Strategy for CRM Migration (SAP) and Mobile Data Solutions: United Illuminating
- Business Process and eCommerce Strategy for Customer Profile Management: United Airlines
- Strategy and Scoring Rules for Loyalty Programs Awards: United Airlines
- Operations and Performance Engineering Analysis for DSL Provisioning Operations: Rhythms
- Market Analysis for emerging business model in eCommerce Websites: Tanning Technology
- Product Plan for standard Mobile Data to CRM Solutions for Utility Operations: Utility Partners
- Business/Technology Analysis & Integration Strategy for Mobile Data: Montana Dakota Utilities
- Business/Technology Analysis & Integration Strategy for CRM & Mobile Operations: EPCOR
- Technology Analysis & Integration Strategy for Inspection & Maintenance: Stadtwerks Goettingen
- User Interface Design/Integration Strategy for CRM & Mobile Data Operations: Dominion Power
- User Interface Design/Integration Strategy for CRM & Mobile Data Operations: Wisconsin Energy
- User Interface Design/Integration Strategy for CRM & Mobile Data Operations: NIPSCO

Sample Case Experience:

Electric Power Group, LLC v. Alstom, S.A. et al

Jurisdiction:	Central District of California
Client:	Alstom
Nature of Case:	Patent Litigation
Nature of Engagement:	Testifying expert analyzing data collection, transformation, communication protocols and visualization techniques for displaying electric phaser data in relation to grid outage detection methods.
Represented by:	Shook, Hardy & Bacon, L.L.P.
Status:	Alstom Summary Judgement

Automated Business Companies v. ENC Technology Corp et al

Jurisdiction:	U.S. District Court, Southern District of Texas
Client:	Automated Business Companies
Nature of Case:	Multi-defendant Patent Litigation (including: NTR, Citrix, Cisco)

Nature of Engagement:	Testifying expert analyzing web-based user interface and providing expertise in remote control technology, opinions on patent validity and infringement, web practices; rebuttal and expert documentation.
Represented by:	Dunlap Codding, P.C.
Status:	Closed

Duick v. Toyota Motor Sales, USA, Inc. (Saatchi & Saatchi)

Jurisdiction:	Los Angeles Superior Court
Client:	Saatchi & Saatchi
Nature of Case:	Website Usability Analysis
Nature of Engagement:	Testifying expert analyzing web-based user interfaces, website usability, browser navigation and compatibility across multiple platforms and standard web user interface development practices.
Represented by:	Ogletree, Deakins, Nash, Smoak & Stewart, P.C.
Status:	Judgment on Usability in favor of Saatchi & Saatchi for Toyota

Nuance Communications v. TellMe Networks (a Microsoft Subsidiary)

Jurisdiction:	U.S. District Court, Delaware
Client:	TellMe Networks
Nature of Case:	Patent Litigation
Nature of Engagement:	Provide expertise in speech recognition and call center technology, prior art investigation, opinions on patent validity and non-infringement.
Represented by:	Patterson Belknap Webb & Tyler, LLP
Status:	Summary Judgment in favor of TellMe

Epic Tech v. PenTech

Jurisdiction:	U.S. Patent and Trademark Office
Client:	Epic Tech
Nature of Case:	IPR/Patent Litigation
Nature of Engagement:	Provide expertise in mobile software applications, internet/server-based solutions and user interfaces.
Represented by:	Baker Donelson
Status:	Currently In Process; awaiting Summary Judgement

QTech v. Walmart

Jurisdiction:	U.S. District Court, Southern District of Texas
Client:	Walmart
Nature of Case:	Patent Litigation – Invalidity
Nature of Engagement:	Provide expertise in Mobile POS devices, internet/server-based solutions, content sharing and user interfaces.
Represented by:	DLA Piper US, LLC
Status:	Judgement in favor of Walmart; QTech Patents found invalid

Anywhere Commerce/BBPOS v. Ingenico, Inc. et al

Jurisdiction:	U.S. District Court, District of Massachusetts
Client:	Anywhere Commerce/BBPOS

Nature of Case:	Trade Secret Litigation
Nature of Engagement:	Provide expertise in POS devices, SDKs, encryption algorithms and credit card processing protocols and mobile device connectivity.
Represented by:	Kutak Rock, LLP
Status:	Trial concluded; awaiting Bench decision

Anywhere Commerce v. Square, Inc.

Jurisdiction:	U.S. Patent and Trademark Office
Client:	Anywhere Commerce
Nature of Case:	IPR/Patent Litigation
Nature of Engagement:	Provide expertise in POS device operation, cellular protocols, credit card protocols/standards, encryption and mobile device connectivity.
Represented by:	Kutak Rock, LLP
Status:	Closed

Delpha Louise Brown v. Edgar Camacho for American National Insurance

Jurisdiction:	Circuit Court of 17th Judicial Circuit, Broward County, Florida
Client:	Edgar Camacho, Jr.
Nature of Case:	Cellular Forensics
Nature of Engagement:	Testifying expert providing expertise in cellular phone and messaging technology and opinions on billing data and cellular application transactions from mediation through deposition.
Represented by:	Conroy, Simberg, Ganon, Krevans & Abel, P. A.
Status:	Settled

Ameranth v. Six Continents Hotels

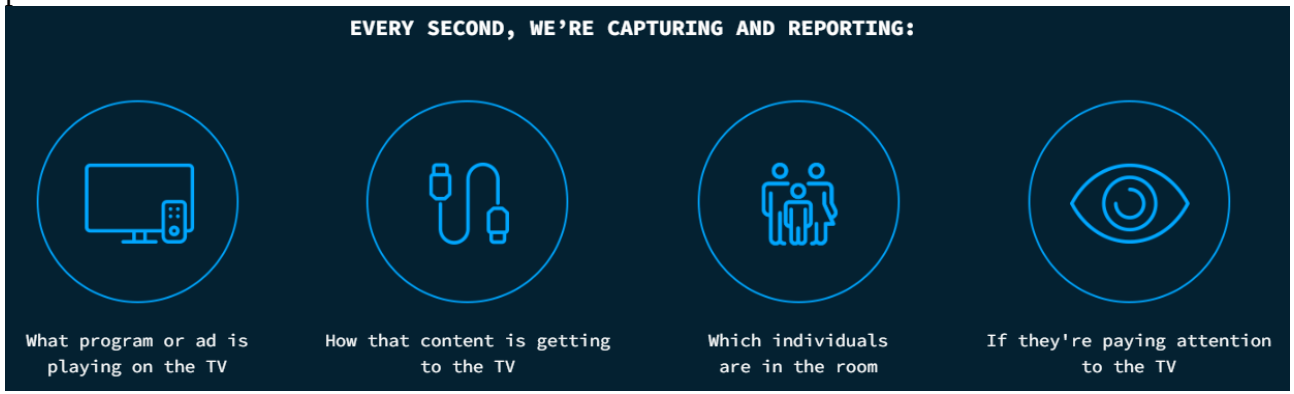
Jurisdiction:	U.S. District Court, Atlanta, Georgia
Client:	Six Continents as defendant in complaint for web advertising misuse and trade secret infringement of web-based concierge application
Nature of Case:	Web Advertising Analysis and Intellectual Property Litigation
Nature of Engagement:	Testifying expert analyzing web-based advertising practices, user interfaces, and development models; provided expertise in web marketing, online advertising, and eCommerce technology development standards, design and architecture
Represented by:	Alston & Bird
Status:	Settled in favor of Defendants, 2010

Lostaunau v. PSL

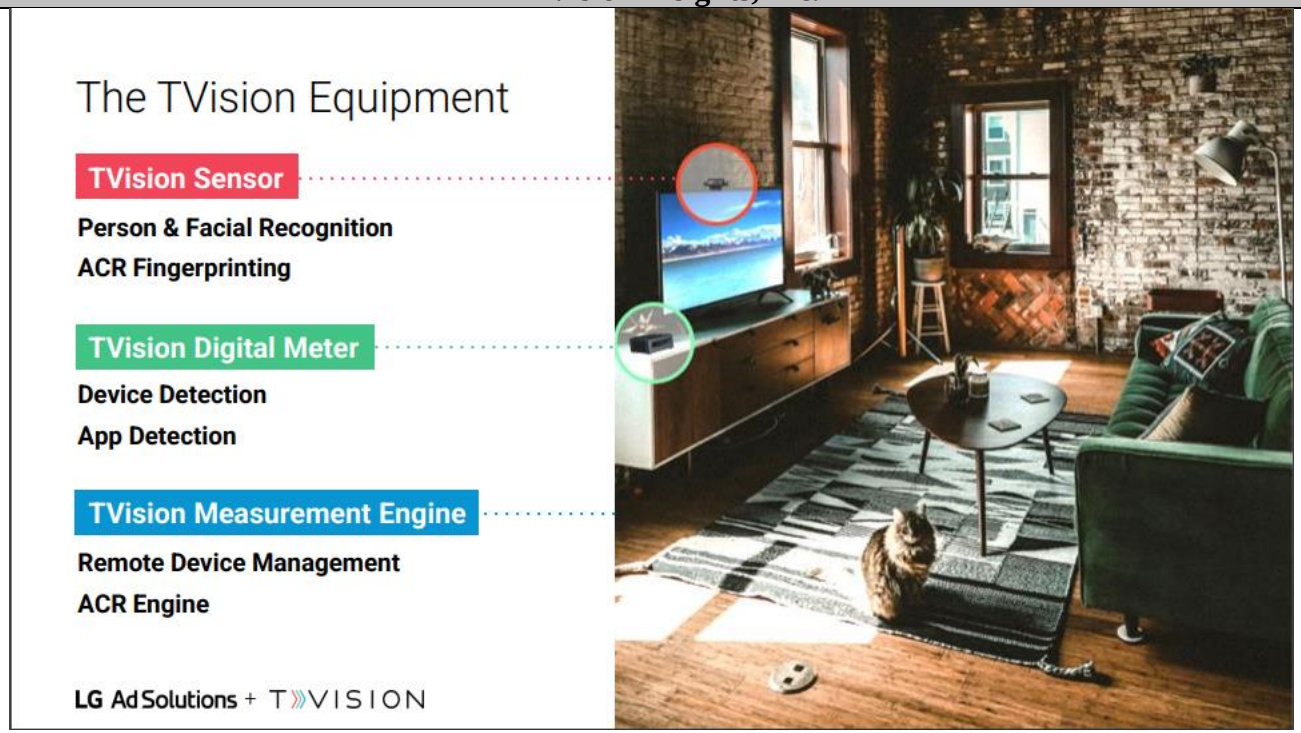
Jurisdiction:	In the Court of Common Pleas, Philadelphia County, Pennsylvania
Client:	Michael & Hillary Lostaunau
Nature of Case:	Website Usability Analysis
Nature of Engagement:	Testifying expert analyzing web-based user interfaces, specifically clickwrap liability waivers and user/IP address authentication.
Represented by:	Saltz, Mongeluzzi, Barrett & Bendesky, P.C.
Status:	Settled

EXHIBIT 3

Claim Charts for U.S. Patent No. 12,047,642

Claim 1	TVision Insights, Inc.
A network meter for monitoring network traffic at a media exposure measurement location, the media exposure measurement location comprising a streaming device, the network meter, and a router separate from the network meter, wherein the streaming device, the network meter, and the router are connected to a local area network of the media exposure measurement location, the network meter comprising:	TVision is an audience measurement entity. *See* Ex. 10, https://www.tvisioninsights.com/about ("TVision's cutting-edge computer vision technology gathers second-by-second data from a nationally representative panel of households. Our person-level insights are critical components driving innovation at the major providers of alternative currency for TV measurement. Measurement leaders like iSpot, VideoAmp, and Oracle all trust TVision data."). Through measurement of linear TV, "hundreds of apps including CTV walled gardens," and more, TVision has proclaimed itself to be "the industry's most comprehensive view of linear and CTV." *See* Ex. 6, https://www.tvisioninsights.com/total-view. TVision measures "how, what, and when" their panelists watch TV.  *See* Ex. 5, https://www.tvisioninsights.com/. TVision's audience measurement solution includes a camera that is set up on a panelist's TV (e.g., placed above or below the TV with a mount clip) as well as a computer that captures audio of the program or commercial being presented on the TV. The computer is also connected to the panelist's home Internet network using an Ethernet cable or connected to the panelist's home WiFi network using a phone or laptop. *See* Ex. 13, https://www.tvisioninsights.com/resources/tvision-methodology-overview; Ex. 14, https://www.mytvpanel.com/about; and Ex. 4, https://www.tvisioninsights.com/our-technology.

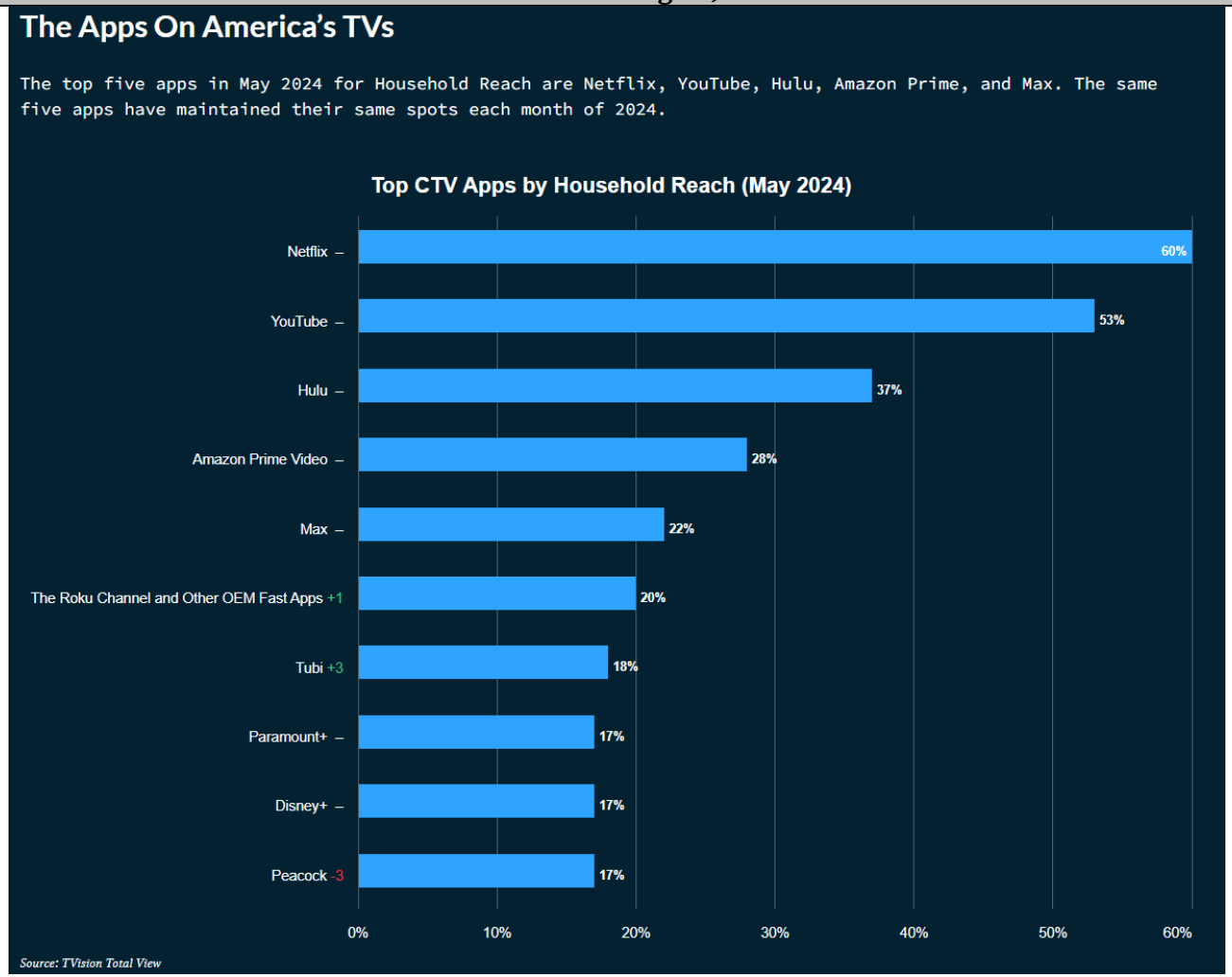
Claim 1	TVision Insights, Inc.
	 Ex. 15, "Join the TVision Panel" at 1:09, available at https://vimeo.com/295447727/3506f24b2b. TVision refers to their computer as a meter or a "digital meter."

Claim 1	TVision Insights, Inc.
	 Ex. 17, Monica Longoria (LG Ad Solutions) and Yan Liu (TVision), "How Co-viewing and Other Factors Impact Viewer Attention to CTV," March 20, 2024, available at https://thearf-org-unified-admin.s3.amazonaws.com/ARF%20Member%20Only%20Events/2024.3.20.21_AxS/Day_1/03_20_2024_Longoria_LG_How%20Co-viewing%20and%20Other%20Factors%20Impact%20Viewer%20Attention%20to%20CTV.pdf

Claim 1	TVision Insights, Inc.
	How TVision measures PERSON-LEVEL ATTENTION & FREQUENCY  Ex. 16, LDV Capital, "Inderbir Sidhu, CTO of TVision: Next Generation Audience Measurement," September 15, 2021, at 5:06, available at https://www.youtube.com/watch?v=gTBEpZo1HcM. For streaming content, the TVision meter "uses network traffic analysis to detect if a digital device is connected and identifies if any streaming apps are in use." *See* Ex. 4, https://www.tvisioninsights.com/our-technology. TVision's meter "will determine if there are any streaming devices running on your network and will ask them what content they're currently playing." *See* Ex. 14, https://www.mytvpanel.com/about. TVision's in-home technology "detect[s] which network, app, and/or streaming device is in use. Basically, if the content plays through the TV or a device connected to the TV, we capture it in our reporting." *See* Ex. 6, https://www.tvisioninsights.com/total-view. "We combine network, app, program, and device data with

Claim 1	TVision Insights, Inc.
	computer vision observations of our panel to report on viewer engagement across the entire TV landscape." *Id.* By identifying streaming apps and streaming content in its panelists' households, TVision generates streaming reports, such as a report of streaming apps per household, as shown below.

Claim 1	TVision Insights, Inc.



Ex. 7, https://www.tvisioninsights.com/signal/june-2-2024.

TVision's meter is a network meter for monitoring network traffic as recited by claim 1.

A panelist's household is a media exposure measurement location as recited by claim 1.

Claim 1	TVision Insights, Inc.
	A router in the panelist's household that provides the home network (e.g., a WiFi network) is a router as recited by claim 1. The home network to which the TVision meter connects is a local area network as recited by claim 1. Any streaming devices that the TVision meter detects would be connected to the home network.
a processor; and	As noted above, the TVision meter is a computer. *See* Ex. 15, TVision, "Join the TVision Panel" at 1:09, available at https://vimeo.com/295447727/3506f24b2b. A processor of the TVision meter is a processor as recited by claim 1.
memory having stored thereon machine-readable instructions that, when executed by the processor, cause performance of operations comprising:	As noted above, the TVision meter is a computer. *See* Ex. 15, TVision, "Join the TVision Panel" at 1:09, available at https://vimeo.com/295447727/3506f24b2b. A memory of the TVision meter storing software is a memory having stored thereon machine-readable instructions that, when executed by the processor, cause performance of operations as recited by claim 1.
monitoring the local area network to identify the streaming device on the local area network, wherein the streaming device is accessing media from the Internet and providing the media to a television for presentation;	As indicated above, the TVision meter "uses network traffic analysis to detect if a digital device is connected and identifies if any streaming apps are in use." *See* Ex. 4, https://www.tvisioninsights.com/our-technology. TVision's meter "will determine if there are any streaming devices running on your network and will ask them what content they're currently playing." *See* Ex. 14, https://www.mytvpanel.com/about. TVision's technology "detect[s] which network, app, and/or streaming device is in use. Basically, if the content plays through the TV or a device connected to the TV, we capture it in our reporting." *See* Ex. 6, https://www.tvisioninsights.com/total-view; *also* Ex. 18, https://www.nttdocomo-v.com/en/news/f8tj1l7s1f/ ("TVision's solution a) identifies who is watching CTV programming and ads, b) on which devices and apps, c) on a second-by-second level across hundreds of apps, and thousands of programs."). The TVision meter using network traffic analysis to detect if a streaming device is connected to and running on the panelist's home network is the monitoring recited by claim 1. A streaming device that is running on the home network and connected to the TV accesses media from the Internet and provides the media to the TV for presentation.

Claim 1	TVision Insights, Inc.
based on identifying the streaming device, querying the streaming device to determine an active streaming application that is associated with a streaming service and running on the streaming device; and	As indicated above, the TVision meter "uses network traffic analysis to detect if a digital device is connected and identifies if any streaming apps are in use." *See* Ex. 4, https://www.tvisioninsights.com/our-technology. TVision's meter "will determine if there are any streaming devices running on your network and will ask them what content they're currently playing." *See* Ex. 14, https://www.mytvpanel.com/about. TVision's technology "detect[s] which network, app, and/or streaming device is in use. Basically, if the content plays through the TV or a device connected to the TV, we capture it in our reporting." *See* Ex. 6, https://www.tvisioninsights.com/total-view; *see also* Ex. 18, https://www.nttdocomo-v.com/en/news/f8tj1l7s1f/ ("TVision's solution a) identifies who is watching CTV programming and ads, b) on which devices and apps, c) on a second-by-second level across hundreds of apps, and thousands of programs."). The TVision meter identifies which streaming apps are in use by asking any streaming devices that it detects on the panelist's home network what streaming apps are in use by those streaming devices. The TVision meter asking a streaming device that has been identified on the home network what streaming app is in use is the querying recited by claim 1.
storing an identifier of the active streaming application.	As indicated above, TVision uses network, app, program, and device data to report on viewer engagement across both linear and CTV. *See* Ex. 6, https://www.tvisioninsights.com/total-view; *see also* Ex. 4, https://www.tvisioninsights.com/our-technology ("Every second, we gather data on how each of our panelists watch TV.") And as indicated above, TVision generates streaming reports, such as a report of streaming apps per household (e.g.,Netflix, YouTube, Hulu, etc.). *See* Ex. 7, https://www.tvisioninsights.com/signal/june-2-2024. Because TVision servers generate reports on streaming, such as streaming app use per household, the TVision meter stores identifiers of streaming apps in use by the streaming devices of its panelists' households and transmits those identifiers to the TVision servers (e.g., for the TVision servers to use to generate reports). The storing of an identifier of a streaming app in use by a streaming device of a panelist household is the storing recited by claim 1.

Claim 2	TVision
The network meter of claim 1, the operations further comprising: transmitting the identifier of the active streaming application via the Internet to a server located remotely from the media exposure measurement location.	As indicated above, because TVision servers generate reports on streaming, such as streaming app use per household, the TVision meter stores identifiers of streaming apps in use by the streaming devices of its panelists' households and transmits those identifiers to the TVision servers. The transmitting of an identifier of the streaming app in use by a streaming device of a panelist household to the TVision servers is the transmitting recited by claim 2.

Claim 3	TVision
The network meter of claim 1, wherein the television is a smart television.	As indicated above, TV viewing measured by TVision includes streaming via apps on a CTV. A CTV is a smart television.

Claim 4	TVision
The network meter of claim 1, wherein the streaming device is connected to, and separate from, the television.	As indicated above, TVision detects which network, app, and/or streaming device is in use for playing content through the TV or a device connected to the TV.

Claim 5	TVision
The network meter of claim 1, wherein the streaming device is configured to	As indicated above, a panelist's home network (e.g., a WiFi network) would include a router via which a streaming device would receive streaming media from the Internet.

Claim 5	TVision
receive the media from the router.	Thus, a streaming device in a panelist household receives streaming media from a router connected to that household's network.

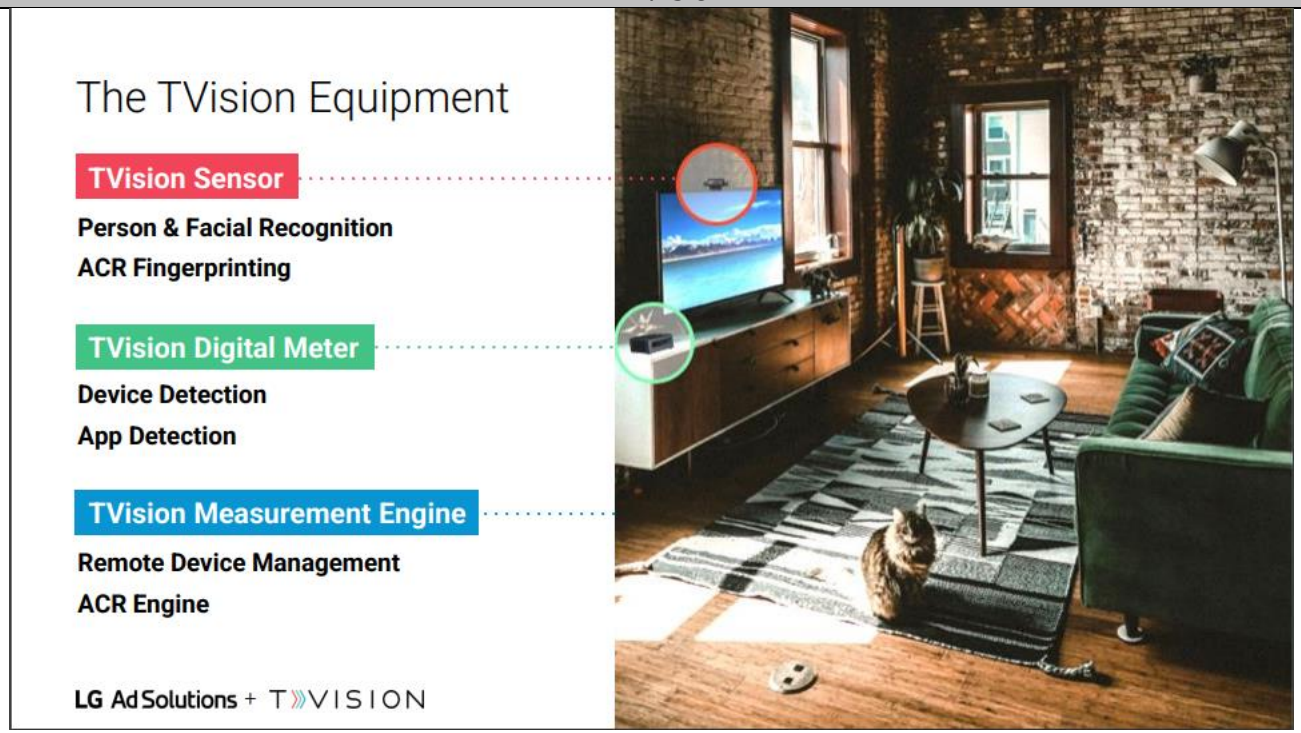
Claim 6	TVision
The network meter of claim 1, wherein the media exposure measurement location comprises a panelist household monitored by an audience measurement entity.	As indicated above, a TVision panelist's household is a media exposure measurement location.

Claim 11	TVision
The network meter of claim 1, the operations further comprising: receiving a message indicating a device type of the streaming device.	As indicated above, the TVision meter "uses network traffic analysis to detect if a digital device is connected and identifies if any streaming apps are in use." *See* Ex. 4, https://www.tvisioninsights.com/our-technology. TVision's meter "will determine if there are any streaming devices running on your network and will ask them what content they're currently playing." *See* Ex. 14, https://www.mytvpanel.com/about. TVision's in-home technology "detect[s] which network, app, and/or streaming device is in use. Basically, if the content plays through the TV or a device connected to the TV, we capture it in our reporting." *See* Ex. 6, https://www.tvisioninsights.com/total-view.

Claim 12	TVision
A non-transitory computer-readable storage medium, having stored thereon machine-readable instructions that, when executed by a processor of a	TVision is an audience measurement entity. *See* Ex. 10, https://www.tvisioninsights.com/about ("TVision's cutting-edge computer vision technology gathers second-by-second data from a nationally representative panel of households. Our person-level insights are critical components driving innovation at the major providers of alternative currency for TV measurement. Measurement leaders like iSpot, VideoAmp, and Oracle all trust TVision data.").

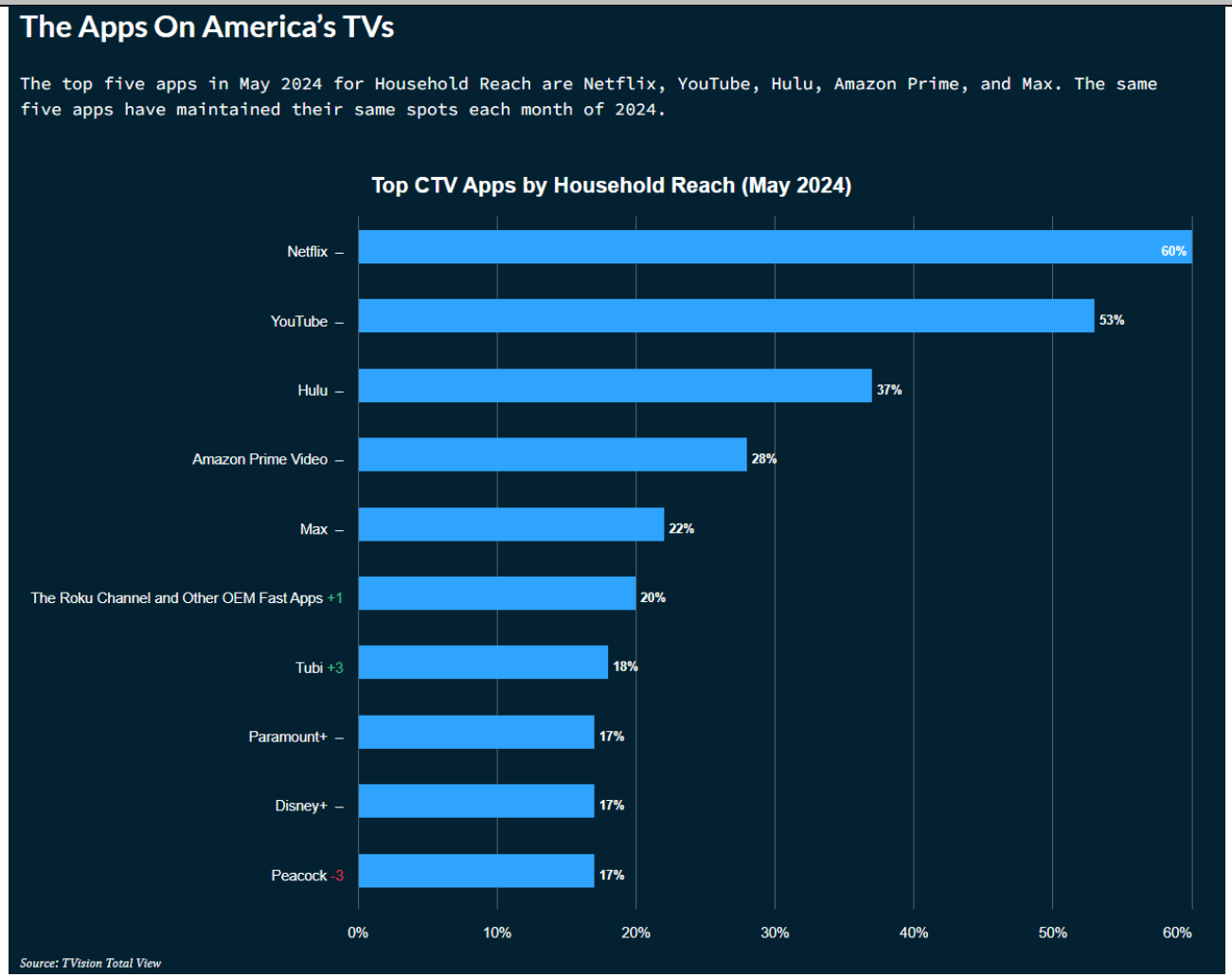
Claim 12	TVision
network meter, cause performance of operations, wherein the network meter is configured for monitoring network traffic at a media exposure measurement location, and wherein the media exposure measurement location comprises a streaming device, the network meter, and a router separate from the network meter, wherein the streaming device, the network meter, and the router are connected to a local area network of the media exposure measurement location, the operations comprising:	Through measurement of linear TV, "hundreds of apps including CTV walled gardens," and more, TVision has proclaimed itself to be "the industry's most comprehensive view of linear and CTV." *See* Ex. 6, https://www.tvisioninsights.com/total-view. TVision measures "how, what, and when" their panelists watch TV.  *See* Ex. 5, https://www.tvisioninsights.com/. TVision's audience measurement solution includes a camera that is set up on a panelist's TV (e.g., placed above or below the TV with a mount clip) as well as a computer that captures audio of the program or commercial being presented on the TV. The computer is also connected to the panelist's home Internet network using an Ethernet cable or connected to the panelist's home WiFi network using a phone or laptop. *See* Ex. 13, https://www.tvisioninsights.com/resources/tvision-methodology-overview; Ex. 14, https://www.mytvpanel.com/about; and Ex. 4, https://www.tvisioninsights.com/our-technology.

Claim 12	TVision
	 Ex. 15, "Join the TVision Panel" at 1:09, available at https://vimeo.com/295447727/3506f24b2b. TVision refers to their computer as a meter or a "digital meter."

Claim 12	TVision
	 Ex. 17, Monica Longoria (LG Ad Solutions) and Yan Liu (TVision), "How Co-viewing and Other Factors Impact Viewer Attention to CTV," March 20, 2024, available at https://thearf-org-unified-admin.s3.amazonaws.com/ARF%20Member%20Only%20Events/2024.3.20.21_AxS/Day_1/03_20_2024_Longoria_LG_How%20Co-viewing%20and%20Other%20Factors%20Impact%20Viewer%20Attention%20to%20CTV.pdf

Claim 12	TVision
	How TVision measures PERSON-LEVEL ATTENTION & FREQUENCY  Ex. 16, LDV Capital, "Inderbir Sidhu, CTO of TVision: Next Generation Audience Measurement," September 15, 2021, at 5:06, available at https://www.youtube.com/watch?v=gTBEpZo1HcM. For streaming content, the TVision meter "uses network traffic analysis to detect if a digital device is connected and identifies if any streaming apps are in use." *See* Ex. 4, https://www.tvisioninsights.com/our-technology. TVision's meter "will determine if there are any streaming devices running on your network and will ask them what content they're currently playing." *See* Ex. 14, https://www.mytvpanel.com/about. TVision's in-home technology "detect[s] which network, app, and/or streaming device is in use. Basically, if the content plays through the TV or a device connected to the TV, we capture it in our reporting." *See* Ex. 6, https://www.tvisioninsights.com/total-view. "We combine network, app, program, and device data with

Claim 12	TVision
	computer vision observations of our panel to report on viewer engagement across the entire TV landscape." *Id.* By identifying streaming apps and streaming content in its panelists' households, TVision generates streaming reports, such as a report of streaming apps per household, as shown below.

Claim 12	TVision
	 Ex. 7, https://www.tvisioninsights.com/signal/june-2-2024. TVision's meter is a network meter configured for monitoring network traffic at a media exposure measurement location as recited by claim 12.

Claim 12	TVision
	A processor of the TVision meter is a processor as recited by claim 12. A memory of the TVision meter storing software is a non-transitory computer-readable storage medium, having stored thereon machine-readable instructions that, when executed by a processor of a network meter, cause performance of operations as recited by claim 12. A panelist's household is a media exposure measurement location as recited by claim 12. A router in the panelist's household that provides the home network (e.g., a WiFi network) is a router as recited by claim 12. The home network to which the TVision meter connects is a local area network as recited by claim 12. Any streaming devices that the TVision meter detects would be connected to the home network as well.
monitoring the local area network to identify the streaming device on the local area network, wherein the streaming device is accessing media from the Internet and providing the media to a television for presentation;	As indicated above, the TVision meter "uses network traffic analysis to detect if a digital device is connected and identifies if any streaming apps are in use." *See* Ex. 4, https://www.tvisioninsights.com/our-technology. TVision's meter "will determine if there are any streaming devices running on your network and will ask them what content they're currently playing." *See* Ex. 14, https://www.mytvpanel.com/about. TVision's technology "detect[s] which network, app, and/or streaming device is in use. Basically, if the content plays through the TV or a device connected to the TV, we capture it in our reporting." *See* Ex. 6, https://www.tvisioninsights.com/total-view; *also* Ex. 18, https://www.nttdocomo-v.com/en/news/f8tj1l7s1f/ ("TVision's solution a) identifies who is watching CTV programming and ads, b) on which devices and apps, c) on a second-by-second level across hundreds of apps, and thousands of programs."). The TVision meter using network traffic analysis to detect if a streaming device is connected to and running on the panelist's home network is the monitoring recited by claim 12. A streaming device that is running on the home network and connected to the TV accesses media from the Internet and provides the media to the TV for presentation.

Claim 12	TVision
based on identifying the streaming device, querying the streaming device to determine an active streaming application that is associated with a streaming service and running on the streaming device; and	As indicated above, the TVision meter "uses network traffic analysis to detect if a digital device is connected and identifies if any streaming apps are in use." *See* Ex. 4, https://www.tvisioninsights.com/our-technology. TVision's meter "will determine if there are any streaming devices running on your network and will ask them what content they're currently playing." *See* Ex. 14, https://www.mytvpanel.com/about. TVision's technology "detect[s] which network, app, and/or streaming device is in use. Basically, if the content plays through the TV or a device connected to the TV, we capture it in our reporting." *See* Ex. 6, https://www.tvisioninsights.com/total-view; *see also* Ex. 18, https://www.nttdocomo-v.com/en/news/f8tj1l7s1f/ ("TVision's solution a) identifies who is watching CTV programming and ads, b) on which devices and apps, c) on a second-by-second level across hundreds of apps, and thousands of programs."). The TVision meter identifies which streaming apps are in use by asking any streaming devices that it detects on the panelist's home network what streaming apps are in use by those streaming devices. The TVision meter asking a streaming device that has been identified on the home network what streaming app is in use is the querying recited by claim 12.
storing an identifier of the active streaming application.	As indicated above, TVision uses network, app, program, and device data to report on viewer engagement across both linear and CTV. *See* Ex. 6, https://www.tvisioninsights.com/total-view; *see also* Ex. 4, https://www.tvisioninsights.com/our-technology ("Every second, we gather data on how each of our panelists watch TV.") And as indicated above, TVision generates streaming reports, such as a report of streaming apps per household (e.g.,Netflix, YouTube, Hulu, etc.). *See* Ex. 7, https://www.tvisioninsights.com/signal/june-2-2024. Because TVision servers generate reports on streaming, such as streaming app use per household, the TVision meter stores identifiers of streaming apps in use by the streaming devices of its panelists' households and transmits those identifiers to the TVision servers (e.g., for the TVision servers to use to generate reports). The storing of an identifier of a streaming app in use by a streaming device of a panelist household is the storing recited by claim 12.

Claim 13	TVision
The non-transitory computer-readable storage medium of claim 12, the operations further comprising: transmitting the identifier of the active streaming application via the Internet to a server located remotely from the media exposure measurement location.	As indicated above, because TVision servers generate reports on streaming, such as streaming app use per household, the TVision meter stores identifiers of streaming apps in use by the streaming devices of its panelists' households and transmits those identifiers to the TVision servers. The transmitting of an identifier of the streaming app in use by a streaming device of a panelist household to the TVision servers is the transmitting recited by claim 13.

Claim 14	TVision
The non-transitory computer-readable storage medium of claim 12, wherein the streaming device is connected to, and separate from, the television.	As indicated above, TVision detects which network, app, and/or streaming device is in use for playing content through the TV or a device connected to the TV.

Claim 15	TVision
The non-transitory computer-readable storage medium of claim 12, wherein the streaming device is configured to	As indicated above, a panelist's home network (e.g., a WiFi network) would include a router via which a streaming device would receive streaming media from the Internet. Thus, a streaming device in a panelist household receives streaming media from a router connected to that household's network.

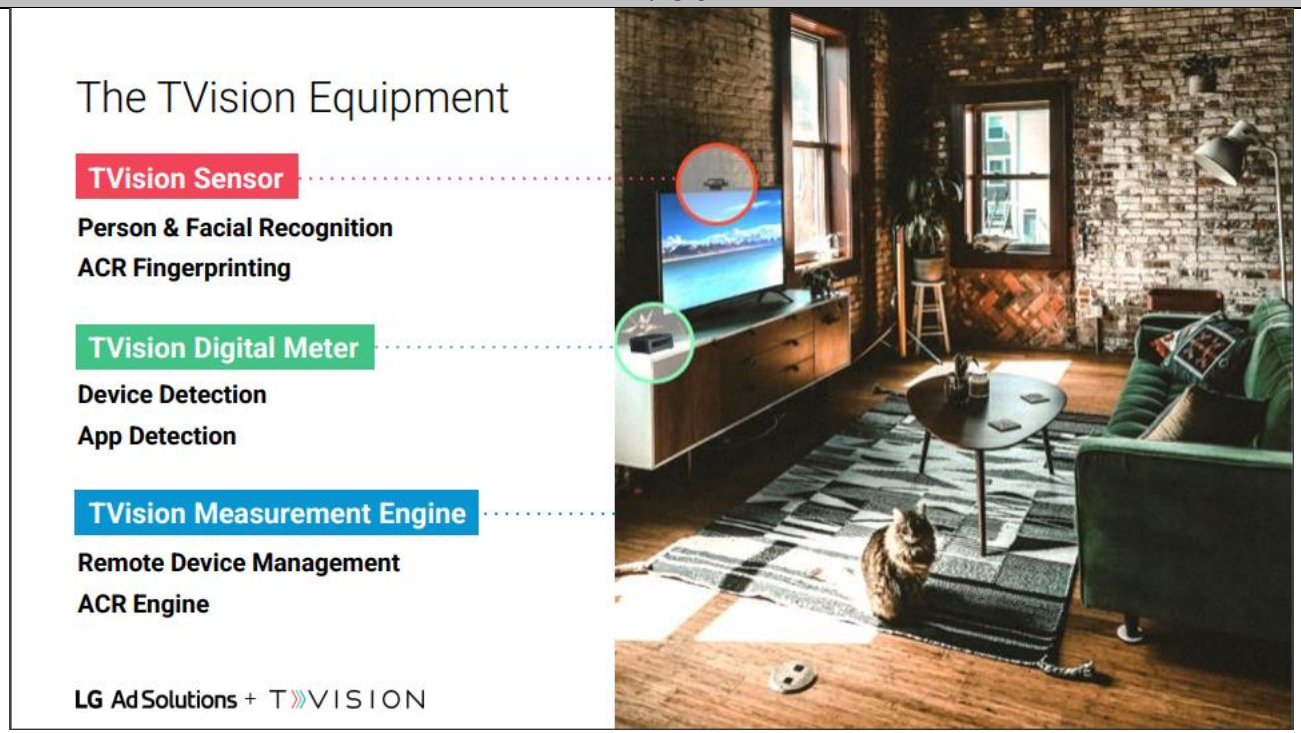
Claim 15	TVision
receive the media from the router.	

Claim 16	TVision
The non-transitory computer-readable storage medium of claim 12, wherein the media exposure measurement location comprises a panelist household monitored by an audience measurement entity.	As indicated above, a TVision panelist's household is a media exposure measurement location.

Claim 17	TVision
A method for monitoring network traffic at a media exposure measurement location, wherein the method performed is by a network meter, wherein the network meter comprises a processor, and wherein the media exposure measurement location comprises a streaming device, the network meter, and a router separate from the network meter, wherein the streaming device, the	TVision is an audience measurement entity. *See* Ex. 10, https://www.tvisioninsights.com/about ("TVision's cutting-edge computer vision technology gathers second-by-second data from a nationally representative panel of households. Our person-level insights are critical components driving innovation at the major providers of alternative currency for TV measurement. Measurement leaders like iSpot, VideoAmp, and Oracle all trust TVision data."). Through measurement of linear TV, "hundreds of apps including CTV walled gardens," and more, TVision has proclaimed itself to be "the industry's most comprehensive view of linear and CTV." *See* Ex. 6, https://www.tvisioninsights.com/total-view. TVision measures "how, what, and when" their panelists watch TV.

Claim 17	TVision
network meter, and the router are connected to a local area network of the media exposure measurement location, the method comprising:	 *See* Ex. 5, https://www.tvisioninsights.com/. TVision's audience measurement solution includes a camera that is set up on a panelist's TV (e.g., placed above or below the TV with a mount clip) as well as a computer that captures audio of the program or commercial being presented on the TV. The computer is also connected to the panelist's home Internet network using an Ethernet cable or connected to the panelist's home WiFi network using a phone or laptop. *See* Ex. 13, https://www.tvisioninsights.com/resources/tvision-methodology-overview; Ex. 14, https://www.mytvpanel.com/about; and Ex. 4, https://www.tvisioninsights.com/our-technology.

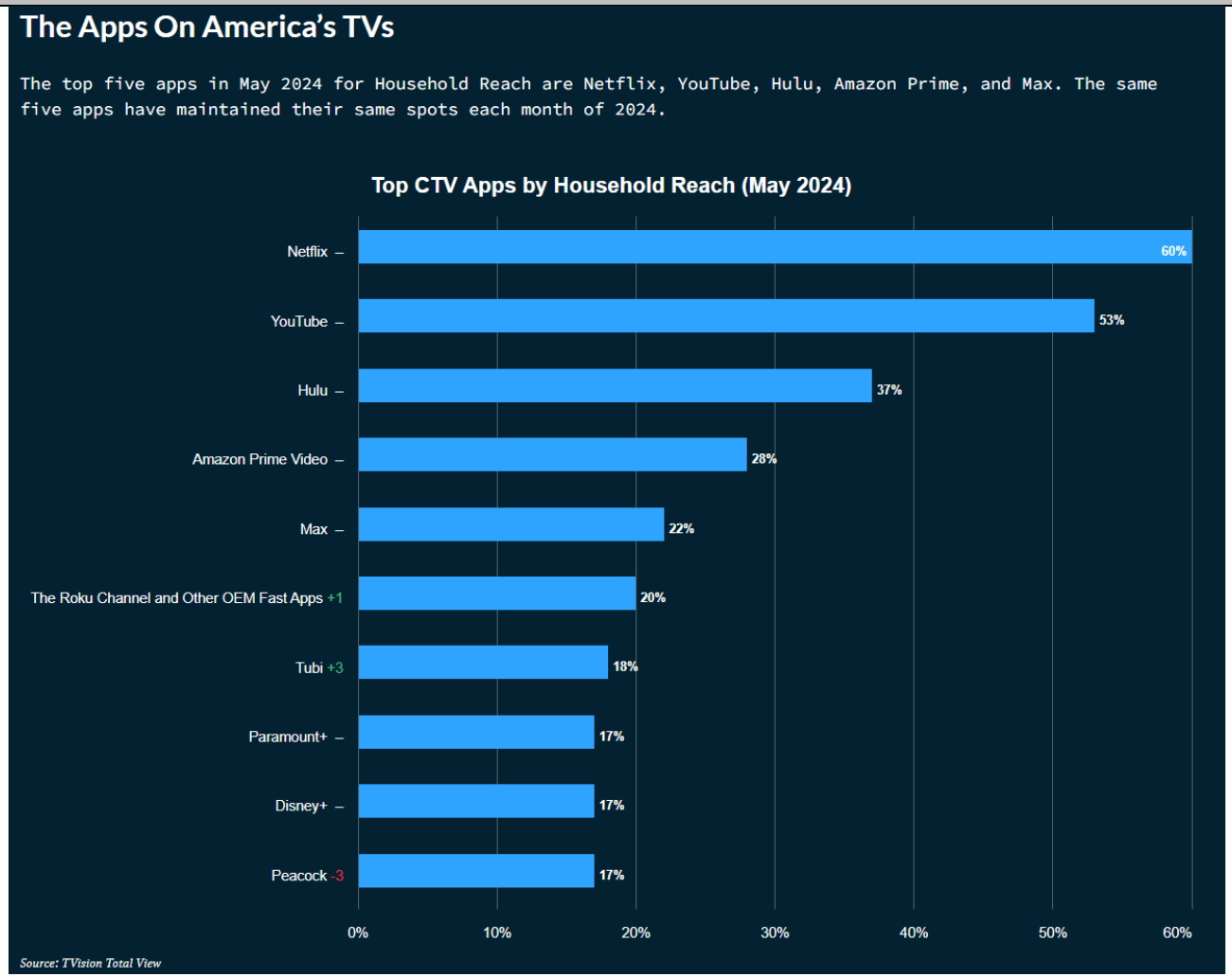
Claim 17	TVision
	 Ex. 15, "Join the TVision Panel" at 1:09, available at https://vimeo.com/295447727/3506f24b2b. TVision refers to their computer as a meter or a "digital meter."

Claim 17	TVision
	 Ex. 17, Monica Longoria (LG Ad Solutions) and Yan Liu (TVision), "How Co-viewing and Other Factors Impact Viewer Attention to CTV," March 20, 2024, available at https://thearf-org-unified-admin.s3.amazonaws.com/ARF%20Member%20Only%20Events/2024.3.20.21_AxS/Day_1/03_20_2024_Longoria_LG_How%20Co-viewing%20and%20Other%20Factors%20Impact%20Viewer%20Attention%20to%20CTV.pdf

Claim 17	TVision
	How TVision measures PERSON-LEVEL ATTENTION & FREQUENCY  Ex. 16, LDV Capital, "Inderbir Sidhu, CTO of TVision: Next Generation Audience Measurement," September 15, 2021, at 5:06, available at https://www.youtube.com/watch?v=gTBEpZo1HcM. For streaming content, the TVision meter "uses network traffic analysis to detect if a digital device is connected and identifies if any streaming apps are in use." *See* Ex. 4, https://www.tvisioninsights.com/our-technology. TVision's meter "will determine if there are any streaming devices running on your network and will ask them what content they're currently playing." *See* Ex. 14, https://www.mytvpanel.com/about. TVision's in-home technology "detect[s] which network, app, and/or streaming device is in use. Basically, if the content plays through the TV or a device connected to the TV, we capture it in our reporting." *See* Ex. 6, https://www.tvisioninsights.com/total-view. "We combine network, app, program, and device data with

Claim 17	TVision
	computer vision observations of our panel to report on viewer engagement across the entire TV landscape." *Id.* By identifying streaming apps and streaming content in its panelists' households, TVision generates streaming reports, such as a report of streaming apps per household, as shown below.

Claim 17	TVision



Ex. 7, https://www.tvisioninsights.com/signal/june-2-2024.

TVision's meter analyzing network traffic to detect streaming devices connected to a panelist's home network and identifying what apps are in use by those streaming devices is a method for monitoring network traffic at a media exposure measurement location as recited by claim 17.

Claim 17	TVision
	TVision's meter is a network meter as recited by claim 17. A processor of the TVision meter is a processor as recited by claim 17. A panelist's household is a media exposure measurement location as recited by claim 17. A router in the panelist's household that provides the home network (e.g., a WiFi network) is a router as recited by claim 17. The home network to which the TVision meter connects is a local area network as recited by claim 16. Any streaming devices that the TVision meter detects would be connected to the home network as well.
monitoring the local area network to identify the streaming device on the local area network, wherein the streaming device is accessing media from the Internet and providing the media to a television for presentation;	As indicated above, the TVision meter "uses network traffic analysis to detect if a digital device is connected and identifies if any streaming apps are in use." *See* Ex. 4, https://www.tvisioninsights.com/our-technology. TVision's meter "will determine if there are any streaming devices running on your network and will ask them what content they're currently playing." *See* Ex. 14, https://www.mytvpanel.com/about. TVision's technology "detect[s] which network, app, and/or streaming device is in use. Basically, if the content plays through the TV or a device connected to the TV, we capture it in our reporting." *See* Ex. 6, https://www.tvisioninsights.com/total-view; *also* Ex. 18, https://www.nttdocomo-v.com/en/news/f8tj1l7s1f/ ("TVision's solution a) identifies who is watching CTV programming and ads, b) on which devices and apps, c) on a second-by-second level across hundreds of apps, and thousands of programs."). The TVision meter using network traffic analysis to detect if a streaming device is connected to and running on the panelist's home network is the monitoring recited by claim 17. A streaming device that is running on the home network and connected to the TV accesses media from the Internet and provides the media to the TV for presentation.
based on identifying the streaming device, querying the streaming device to	As indicated above, the TVision meter "uses network traffic analysis to detect if a digital device is connected and identifies if any streaming apps are in use." *See* Ex. 4, https://www.tvisioninsights.com/our-technology. TVision's meter "will determine if there are any

Claim 17	TVision
determine an active streaming application that is associated with a streaming service and running on the streaming device; and	streaming devices running on your network and will ask them what content they're currently playing." *See* Ex. 14, https://www.mytvpanel.com/about. TVision's technology "detect[s] which network, app, and/or streaming device is in use. Basically, if the content plays through the TV or a device connected to the TV, we capture it in our reporting." *See* Ex. 6, https://www.tvisioninsights.com/total-view; *see also* Ex. 18, https://www.nttdocomo-v.com/en/news/f8tj1l7s1f/ ("TVision's solution a) identifies who is watching CTV programming and ads, b) on which devices and apps, c) on a second-by-second level across hundreds of apps, and thousands of programs."). The TVision meter identifies which streaming apps are in use by asking any streaming devices that it detects on the panelist's home network what streaming apps are in use by those streaming devices. The TVision meter asking a streaming device that has been identified on the home network what streaming app is in use is the querying recited by claim 17.
storing an identifier of the active streaming application.	As indicated above, TVision uses network, app, program, and device data to report on viewer engagement across both linear and CTV. *See* Ex. 6, https://www.tvisioninsights.com/total-view; *see also* Ex. 4, https://www.tvisioninsights.com/our-technology ("Every second, we gather data on how each of our panelists watch TV.") And as indicated above, TVision generates streaming reports, such as a report of streaming apps per household (e.g.,Netflix, YouTube, Hulu, etc.). *See* Ex. 7, https://www.tvisioninsights.com/signal/june-2-2024. Because TVision servers generate reports on streaming, such as streaming app use per household, the TVision meter stores identifiers of streaming apps in use by the streaming devices of its panelists' households and transmits those identifiers to the TVision servers (e.g., for the TVision servers to use to generate reports). The storing of an identifier of a streaming app in use by a streaming device of a panelist household is the storing recited by claim 17.

Claim 18	TVision
The method of claim 17, further comprising: transmitting the identifier of the active streaming application via the Internet to a server located remotely from the media exposure measurement location.	As indicated above, because TVision servers generate reports on streaming, such as streaming app use per household, the TVision meter stores identifiers of streaming apps in use by the streaming devices of its panelists' households and transmits those identifiers to the TVision servers. The transmitting of an identifier of the streaming app in use by a streaming device of a panelist household to the TVision servers is the transmitting recited by claim 18.

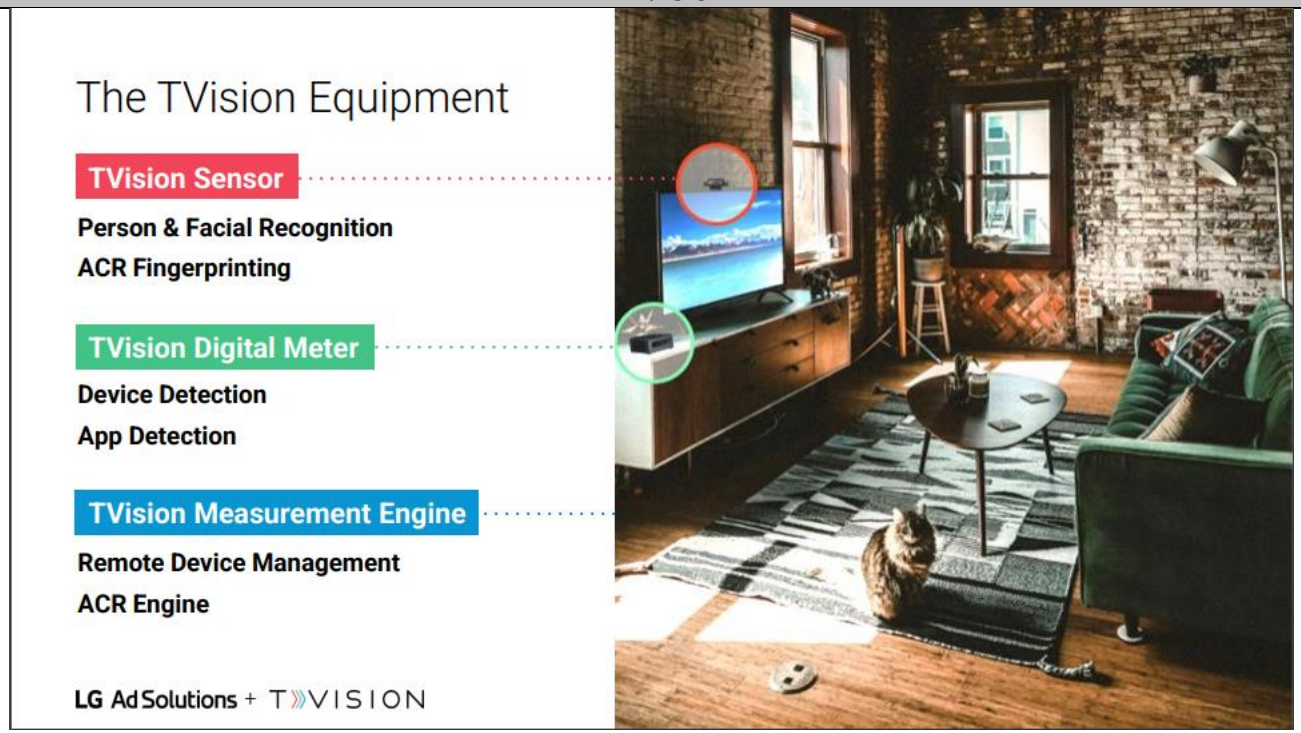
Claim 19	TVision
The method of claim 17, wherein: the streaming device is connected to, and separate from, the television, and	As indicated above, TVision detects which network, app, and/or streaming device is in use for playing content through the TV or a device connected to the TV.
the streaming device is configured to receive the media from the router.	As indicated above, a panelist's home network (e.g., a WiFi network) would include a router via which a streaming device would receive streaming media from the Internet. Thus, a streaming device in a panelist household receives streaming media from a router connected to that household's network.

Claim 20	TVision
The method of claim 17, wherein the media exposure measurement location comprises a panelist household monitored by an	As indicated above, a TVision panelist's household is a media exposure measurement location.

Claim 20	TVision
audience measurement entity.	

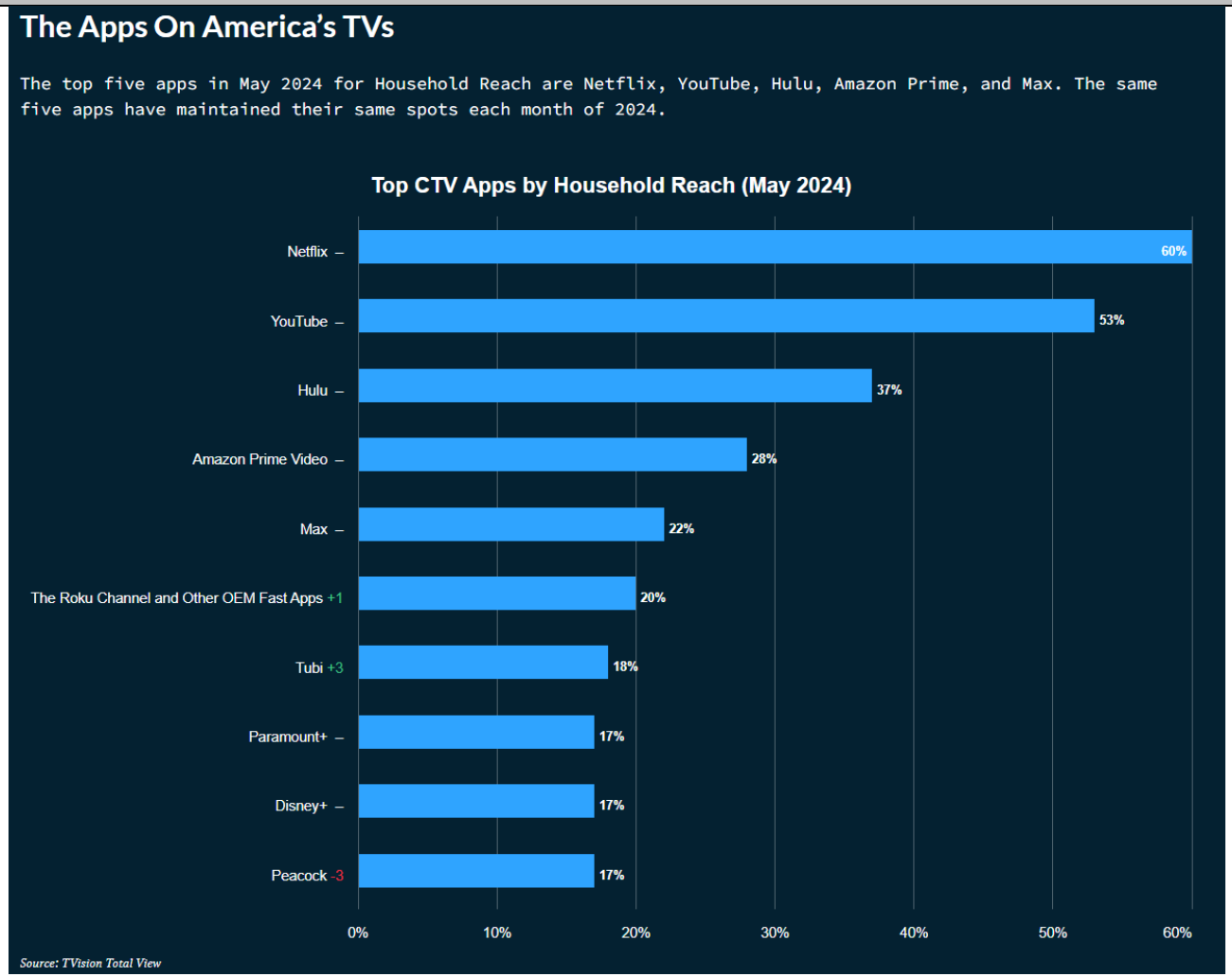
Claim 21	TVision
A network meter for monitoring network traffic at a media exposure measurement location, the media exposure measurement location comprising a television, the network meter, and a router separate from the network meter, wherein the television, the network meter, and the router are connected to a local area network of the media exposure measurement location, the network meter comprising:	TVision is an audience measurement entity. *See* Ex. 10, https://www.tvisioninsights.com/about ("TVision's cutting-edge computer vision technology gathers second-by-second data from a nationally representative panel of households. Our person-level insights are critical components driving innovation at the major providers of alternative currency for TV measurement. Measurement leaders like iSpot, VideoAmp, and Oracle all trust TVision data."). Through measurement of linear TV, "hundreds of apps including CTV walled gardens," and more, TVision has proclaimed itself to be "the industry's most comprehensive view of linear and CTV." *See* Ex. 6, https://www.tvisioninsights.com/total-view. TVision measures "how, what, and when" their panelists watch TV.  *See* Ex. 5, https://www.tvisioninsights.com/. TVision's audience measurement solution includes a camera that is set up on a panelist's TV (e.g., placed above or below the TV with a mount clip) as well as a computer that captures audio of the program or commercial being presented on the TV. The computer is also connected to the panelist's home Internet network using an Ethernet cable or connected to the panelist's home WiFi network using a phone or laptop. *See* Ex. 13, https://www.tvisioninsights.com/resources/tvision-methodology-

Claim 21	TVision
	overview; Ex. 14, https://www.mytvpanel.com/about; and Ex. 4, https://www.tvisioninsights.com/our-technology.  Ex. 15, "Join the TVision Panel" at 1:09, available at https://vimeo.com/295447727/3506f24b2b. TVision refers to their computer as a meter or a "digital meter."

Claim 21	TVision
	 Ex. 17, Monica Longoria (LG Ad Solutions) and Yan Liu (TVision), "How Co-viewing and Other Factors Impact Viewer Attention to CTV," March 20, 2024, available at https://thearf-org-unified-admin.s3.amazonaws.com/ARF%20Member%20Only%20Events/2024.3.20.21_AxS/Day_1/03_20_2024_Longoria_LG_How%20Co-viewing%20and%20Other%20Factors%20Impact%20Viewer%20Attention%20to%20CTV.pdf

Claim 21	TVision
	How TVision measures PERSON-LEVEL ATTENTION & FREQUENCY  Ex. 16, LDV Capital, "Inderbir Sidhu, CTO of TVision: Next Generation Audience Measurement," September 15, 2021, at 5:06, available at https://www.youtube.com/watch?v=gTBEpZo1HcM. For streaming content, the TVision meter "uses network traffic analysis to detect if a digital device is connected and identifies if any streaming apps are in use." *See* Ex. 4, https://www.tvisioninsights.com/our-technology. TVision's meter "will determine if there are any streaming devices running on your network and will ask them what content they're currently playing." *See* Ex. 14, https://www.mytvpanel.com/about. TVision's in-home technology "detect[s] which network, app, and/or streaming device is in use. Basically, if the content plays through the TV or a device connected to the TV, we capture it in our reporting." *See* Ex. 6, https://www.tvisioninsights.com/total-view. "We combine network, app, program, and device data with

Claim 21	TVision
	computer vision observations of our panel to report on viewer engagement across the entire TV landscape." *Id.* By identifying streaming apps and streaming content in its panelists' households, TVision generates streaming reports, such as a report of streaming apps per household, as shown below.

Claim 21	TVision
	 Ex. 7, https://www.tvisioninsights.com/signal/june-2-2024. TVision's meter is a network meter for monitoring network traffic as recited by claim 21. A CTV is a television as recited by claim 21.

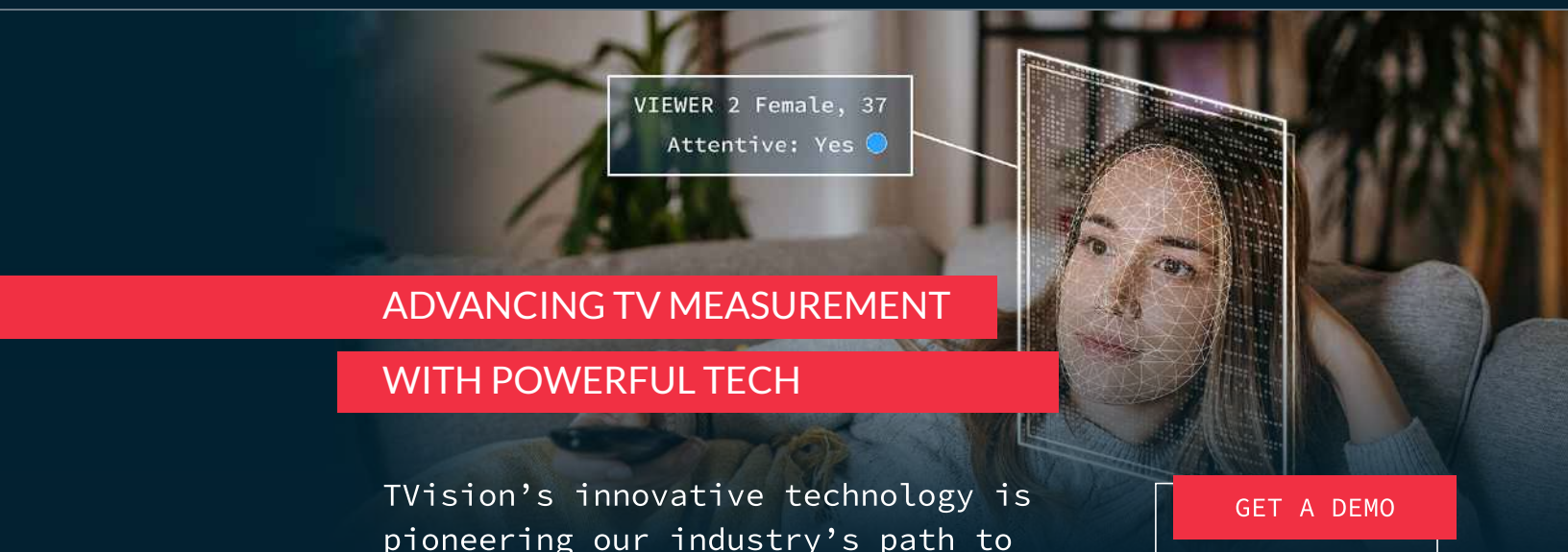
Claim 21	TVision
	A panelist's household is a media exposure measurement location as recited by claim 21. A router in the panelist's household that provides the home network (e.g., a WiFi network) is a router as recited by claim 21. The home network to which the TVision meter connects is a local area network as recited by claim 21. Any streaming devices that the TVision meter detects, including a CTV, would be connected to the home network as well.
a processor; and	As noted above, the TVision meter is a computer. *See* Ex. 15, TVision, "Join the TVision Panel" at 1:09, available at https://vimeo.com/295447727/3506f24b2b. A processor of the TVision meter is a processor as recited by claim 21.
memory having stored thereon machine-readable instructions that, when executed by the processor, cause performance of operations comprising:	As noted above, the TVision meter is a computer. *See* Ex. 15, TVision, "Join the TVision Panel" at 1:09, available at https://vimeo.com/295447727/3506f24b2b. A memory of the TVision meter storing software is a memory having stored thereon machine-readable instructions that, when executed by the processor, cause performance of operations as recited by claim 21.
monitoring the local area network to identify the television on the local area network, wherein the television is accessing media from the Internet and presenting the media;	As indicated above, the TVision meter "uses network traffic analysis to detect if a digital device is connected and identifies if any streaming apps are in use." *See* Ex. 4, https://www.tvisioninsights.com/our-technology. TVision's meter "will determine if there are any streaming devices running on your network and will ask them what content they're currently playing." *See* Ex. 14, https://www.mytvpanel.com/about. TVision's technology "detect[s] which network, app, and/or streaming device is in use. Basically, if the content plays through the TV or a device connected to the TV, we capture it in our reporting." *See* Ex. 6, https://www.tvisioninsights.com/total-view; *also* Ex. 18, https://www.nttdocomo-v.com/en/news/f8tj1l7s1f/ ("TVision's solution a) identifies who is watching CTV programming and ads, b) on which devices and apps, c) on a second-by-second level across hundreds of apps, and thousands of programs."). The TVision meter using network traffic analysis to detect if a streaming device is connected to and running on the panelist's home network is the monitoring recited by claim 21.

Claim 21	TVision
	A CTV that is connected to the home network accesses media from the Internet and presents the media.
based on identifying the television, querying the television to determine an active streaming application that is associated with a streaming service and running on the television; and	As indicated above, the TVision meter "uses network traffic analysis to detect if a digital device is connected and identifies if any streaming apps are in use." *See* Ex. 4, https://www.tvisioninsights.com/our-technology. TVision's meter "will determine if there are any streaming devices running on your network and will ask them what content they're currently playing." *See* Ex. 14, https://www.mytvpanel.com/about. TVision's technology "detect[s] which network, app, and/or streaming device is in use. Basically, if the content plays through the TV or a device connected to the TV, we capture it in our reporting." *See* Ex. 6, https://www.tvisioninsights.com/total-view; *see also* Ex. 18, https://www.nttdocomo-v.com/en/news/f8tj1l7s1f/ ("TVision's solution a) identifies who is watching CTV programming and ads, b) on which devices and apps, c) on a second-by-second level across hundreds of apps, and thousands of programs."). The TVision meter identifies which streaming apps are in use by asking any streaming devices that it detects on the panelist's home network what streaming apps are in use by those streaming devices. The TVision meter asking a streaming device that has been identified on the home network what streaming app is in use is the querying recited by claim 21.
transmitting an identifier of the active streaming application via the Internet to a server located remotely from the media exposure measurement location.	As indicated above, TVision uses network, app, program, and device data to report on viewer engagement across both linear and CTV. *See* Ex. 6, https://www.tvisioninsights.com/total-view; *see also* Ex. 4, https://www.tvisioninsights.com/our-technology ("Every second, we gather data on how each of our panelists watch TV.") And as indicated above, TVision generates streaming reports, such as a report of streaming apps per household (e.g.,Netflix, YouTube, Hulu, etc.). *See* Ex. 7, https://www.tvisioninsights.com/signal/june-2-2024. Because TVision servers generate reports on streaming, such as streaming app use per household, the TVision meter stores identifiers of streaming apps in use by the streaming devices of its panelists' households and transmits those identifiers to the TVision servers (e.g., for the TVision servers to use to generate reports).

Claim 21	TVision
	The transmitting of an identifier of a streaming app in use by a CTV of a panelist household is the transmitting recited by claim 21.

EXHIBIT 4

TVISION



ADVANCING TV MEASUREMENT WITH POWERFUL TECH

TVision's innovative technology is pioneering our industry's path to smarter and more accurate measurement

GET A DEMO

Creative Engineering Solves Complex Problems

TVision's end product is a SaaS platform, but we're not your typical SaaS company. Our SaaS platform is powered by proprietary hardware, software, and advanced data models. We've developed a privacy-safe combination of sophisticated in-home computer-vision technology, IOT, and AI-powered data processing to measure TV viewing

It Starts With Understanding How People Really Watch TV

TVision's in-home hardware is independently installed by our panelists. It is a privacy-first solution that provides unprecedented insight into how people really watch TV.

TVision Sensor

Our Sensor uses sophisticated facial recognition to detect who is in the room and matches data with ACR technology to understand what is on the TV.

TVision Digital Meter

Our Digital Meter uses network traffic analysis to detect if a digital device is connected and identifies if any streaming apps are in use.

TVision Measurement Engine

Our measurement engine remotely manages and supports thousands of in-home devices. It also identifies the source of content at any given second.

We Make Sense of a Challenging Data Set

Every second, we gather data on how each of our panelists watch TV. TVision's in-house developed and trained models help us understand who is watching, and if they are paying attention. We match and classify what they're watching with an extensive library of programming and ads. ACR and local network analysis ensures we can identify how and where that content is being delivered to the TV.

130 National channels and major local broadcasters

1100 Different streaming device models

28K Streaming titles

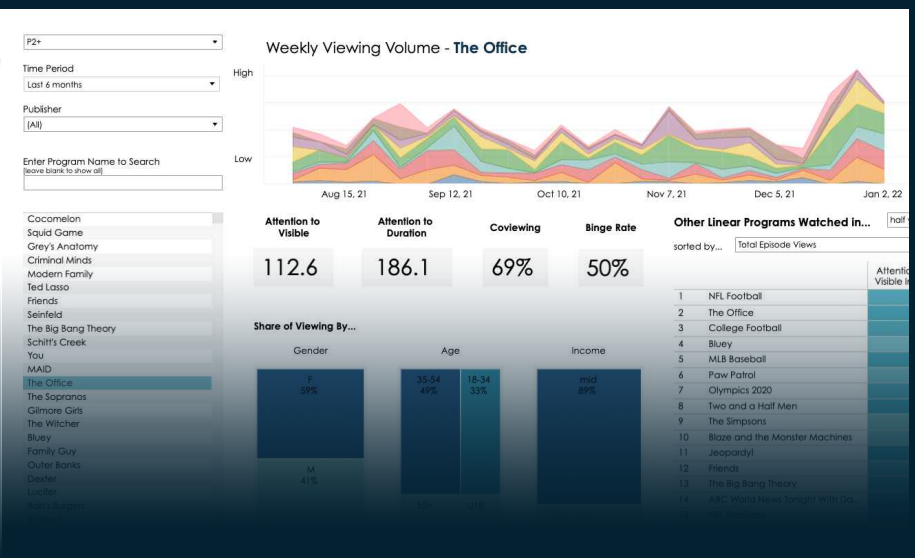
6M Program impressions across linear and CTV

69M Ad Impressions across linear and CTV

24,982,982,928
Measured Panel Seconds

We Turn Second-by-Second Viewing Data Into Powerful Insights

The end result is our industry's only single-source platform for understanding how people really watch both linear and CTV. Our SaaS reporting allows marketers and media sellers to leverage the powerful data our technology collects.



CTV ANALYTICS

TVision's CTV Analytics dashboard breaks down CTV's walled gardens and enables media sellers and market researchers to identify the CTV devices, apps and programming that are driving adoption and engagement. A user-accessible interface delivers powerful insights on co-viewing, attention, share of time spent, and more.

LEARN MORE

LINEAR TV INSIGHTS

TV PLANNING & MEASUREMENT

Innovative Technology, Inspired Engineers

TVision's technology-based approach to second-by-second TV measurement is changing the decades-old way that the TV industry buys, sells and values its inventory. Leveraging the latest engineering best practices and sophisticated technical solutions, including AI and computer vision, our engineering team is inspired everyday to design hardware and software that provides an elegant solution to a complex problem.

TVision's story is one of disruptive innovation. We're a fast-paced, lean organization with large and

clear goals.

Devon Bray
Senior Software Engineer

It's challenging work. Every day I learn something new. The dream of every developer is to investigate and use the latest technology. This is what you do at TVision.

Sebastian Davalle
Senior Software Engineer

We're nimble, suppo and innovative.

Kyle McCluskey
Head of Data Engineeri

JOIN THE ENGINEERING TEAM

Stay Up to Date

The TV landscape is changing quickly. Let us help keep you in the know.

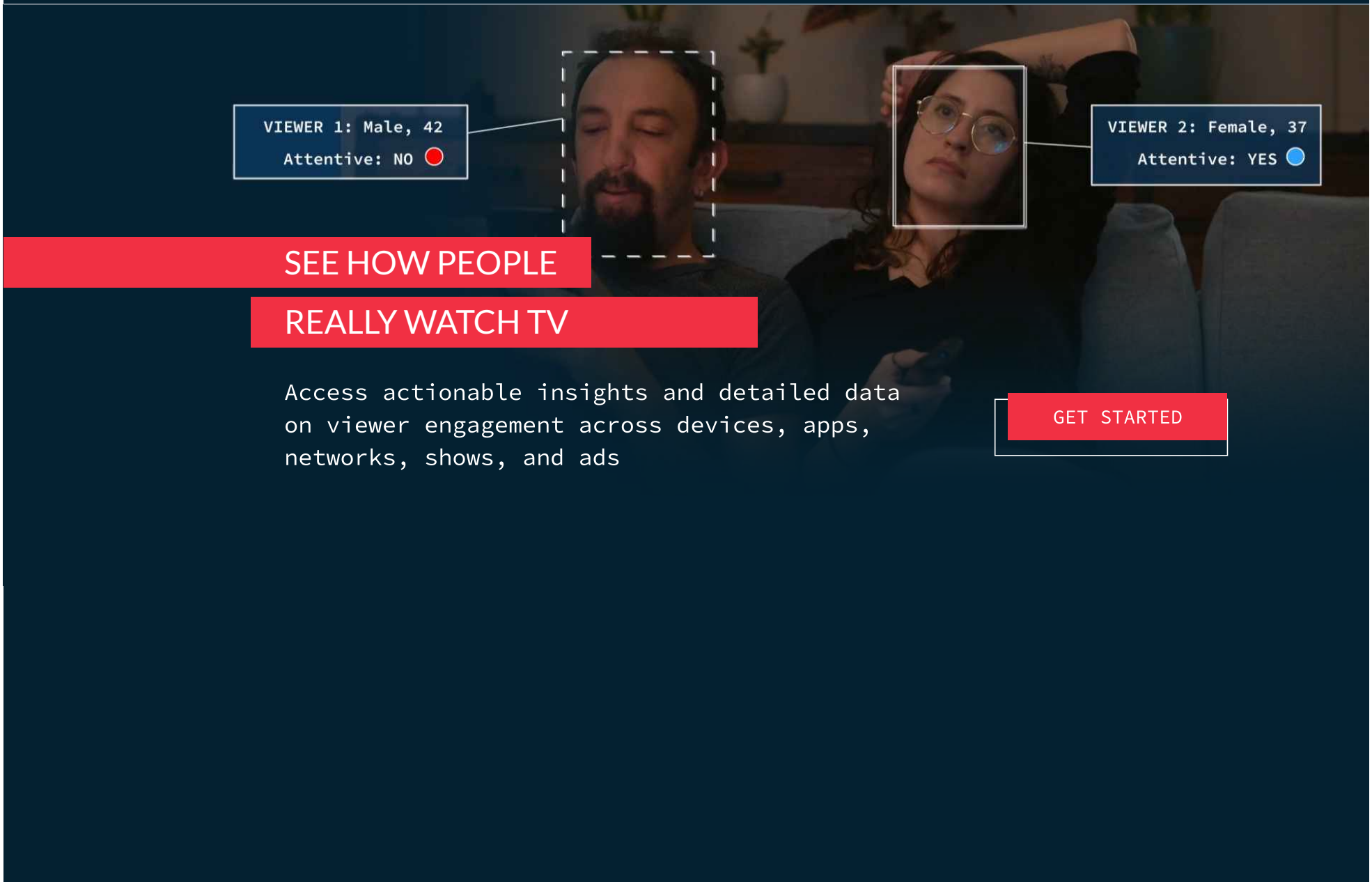
FULL NAME:

EMAIL ADDRESS:*

SUBSCRIBE TO NEWSLETTER

EXHIBIT 5

TVISION



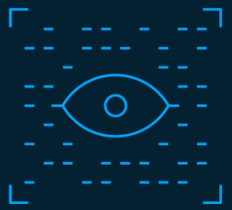
SEE HOW PEOPLE REALLY WATCH TV

Access actionable insights and detailed data on viewer engagement across devices, apps, networks, shows, and ads

GET STARTED

ATTENTION PLATFORM

Know When TV Audiences are Paying Attention



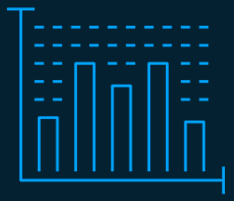
We're the only company capable of measuring real-world viewability and attention for TV. Marketers, networks, apps, and industry watchers all use TVision's SaaS platform to find how TV content and ads engage audiences.

LEARN MORE

PANEL DATA

Strengthen and Expand Your Data

The next generation of TV currencies and measurement platforms are being built with data from TVision's panel. TVision data isn't a black box - we're proud to support a more transparent future for TV measurement.



LEARN MORE

TVision is Trusted By

VIEW ALL

ABInBev

"TVision is now an integral part of our measurement ecosystem."

Paolo Provinciali
Head of US Media
Anheuser-Busch

The Weather Channel®

"Attention is informing buying decisions at brands and agencies, so it's powerful for our sales team to have this data to share."

JT Peace
Associate Director of Ad Sales
The Weather Channel

denl

"I believe that TV
future of TV mea
someone is prese
think those are p
have."

Joanne Leong
VP, Director, C
Dentsu Aegis Ne

INNOVATIVE TECH + PROPRIETARY PANEL

POWER OUR NEXT-GEN SOLUTIONS

TVision gathers second-by-second data from a nationally representative panel of households who have signed on to help our industry understand how, what, and when they watch TV. We turn privacy-safe observations into actionable media insights through a combination of sophisticated in-home computer-vision technology, IOT, and advanced data processing.

EVERY SECOND, WE'RE CAPTURING AND REPORTING:

What program or ad is playing on the TV

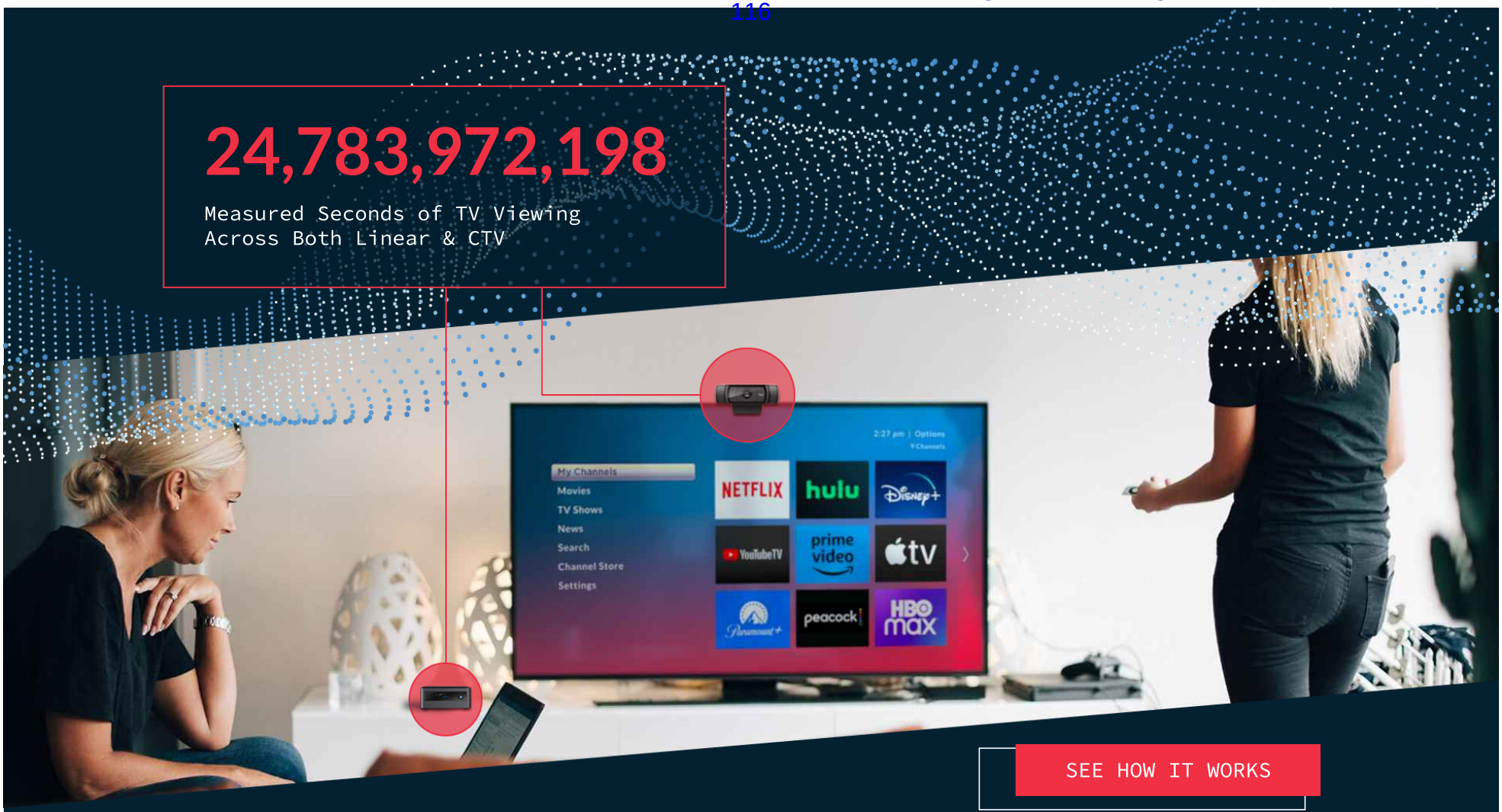
How that content is getting to the TV

Which individuals are in the room

If they're paying attention to the TV

24,783,972,198

Measured Seconds of TV Viewing
Across Both Linear & CTV



SEE HOW IT WORKS

Our Solutions

FOR BRANDS & AGENCIES

AD SCOREBOARD

Easily add Attention data to your day-to-day with quick insights on any brand, creative, or network-all in one place.

GO TO AD SCOREBOARD

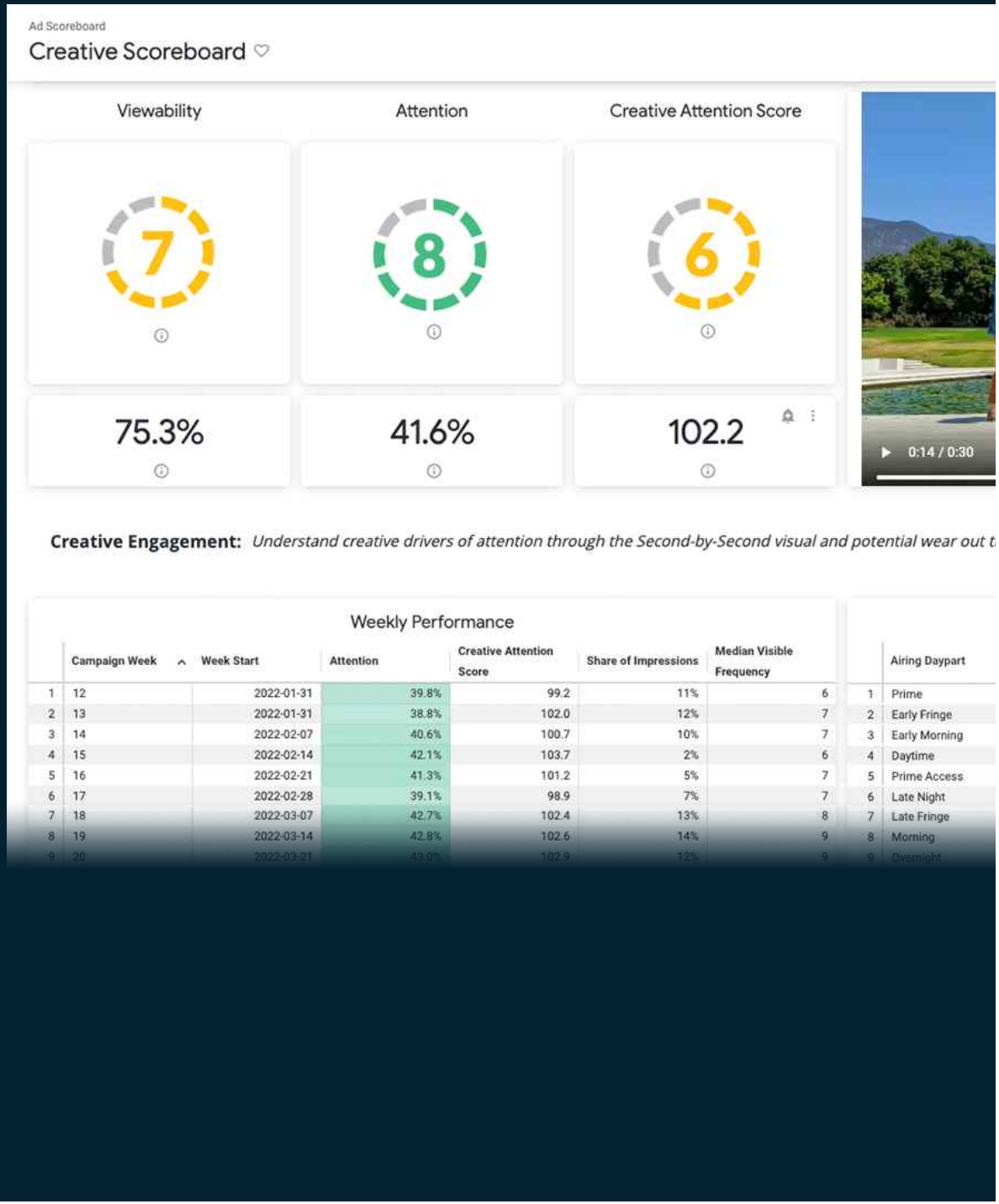
- TV PLANNING & MEASUREMENT
- DIGITAL ACTIVATION
- CREATIVE MONITORING

FOR NETWORKS & STREAMING SERVICES

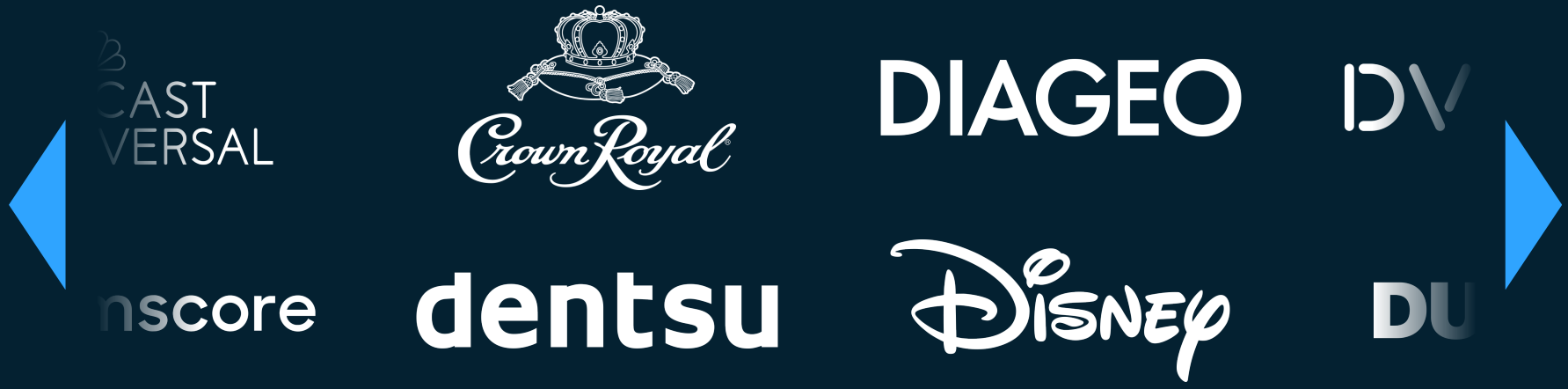
- LINEAR TV INSIGHTS
- CTV ANALYTICS

FOR MEASUREMENT & DATA PARTNERS

- CALIBRATION DATA
- DATA LICENSING



Our Clients



CLIENT CASE STUDIES

VIEW ALL

New Research & Resources



2025 Super Bowl: The Top Ads For Viewer Attention; Plus More Game Data from TVision

The Eagles beat the Chiefs in the game on the field, but which advertiser w...

CASE STUDY BLOG PRESS RELEASE

The TVision State of Streaming Report, January 2025

CASE STUDY B

Inscape and T
Personified C
Behavior for t

GET IN TOUCH

Need more info, have a question, or want a demo? Tell us a little bit more and we'll respond shortly.

FIRST NAME:*

LAST NAME:*

COMPANY:

EMAIL ADDRESS:*

TELL US HOW WE CAN HELP. (OPTIONAL)

AREA OF INTEREST:

- [ ] BRAND & AGENCY SOLUTIONS
- [ ] NETWORK & STREAMING SERVICE SOLUTIONS
- [ ] MEASUREMENT & DATA SOLUTIONS
- [ ] TVISION PANEL SUPPORT
- [ ] MEDIA INQUIRIES
- [ ] MEET US AT EVENTS
- [ ] JOBS AT TVISION
- [ ] OTHER

- [x] YES, SEND ME TVISION NEWS AND CONTENT.

CONTACT US

Stay Up to Date

The TV landscape is changing quickly. Let us help keep you in the know.

SOLUTIONS

Ad Scoreboard

TV Planning & Measurement

Digital Activation

Creative Monitoring

Calibration Data

Data Licensing

RESOURCES

Reports

Blog

Newsroom

Client Login

COMPANY

About TVision

Careers

Media Center

Contact Us

FULL NAME:

EMAIL ADDRESS:*

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EXHIBIT 6

TVISION

THE TOTAL TV LANDSCAPE IN ONE UNIFIED VIEW

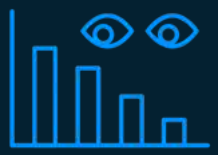
Maximize viewer engagement and demonstrate the true value of your media properties with the industry's most comprehensive look at person-level viewer engagement

GET A DEMO

Detailed Program and Ad Performance Across Linear & CTV

TVision's Total View platform provides media sellers with detailed insight into ad performance and viewer trends across hundreds of apps, networks, and thousands of shows. Use key engagement metrics to evaluate the performance of properties, programming, ads, and audiences

VIEWER PRESENCE



EYES-ON-SCREEN ATTENTION

CO-VIEWING RATE

INCREMENTAL REACH

BINGE RATE

Solutions for Both Ad Sales Support & Program Analysis

AD SALES SUPPORT

GET DETAILED INSIGHT INTO THE PERFORMANCE OF BRANDS AND ADVERTISER CATEGORIES ON YOUR PROPERTIES AND COMPETITORS

Build Out Your Value Proposition for Brands

Get detailed engagement metrics for brands advertising on your linear or CTV properties and how they're trending over time or against the competition

PROGRAM ANALYSIS

BETTER UNDERSTAND WHICH PROGRAMS, CONTENT TYPES, AND PLATFORMS ARE DRIVING THE HIGHEST AUDIENCE ENGAGEMENT

Track the Success of Programming

Compare the performance of different program types like content genres, new vs. repeat episodes, bingeable content, or linear vs. CTV distribution

Uncover Opportunities Where You Have a Right to Win

Arm your sales team with category- and brand-level analysis that validates which marketers will perform best on your properties

Identify Premium Ad Inventory & Programs

Measure the impact of ad environments by pod position, ad length and more. Discover the shows that best engage audiences

Learn More About Who is Engaging with Your Content

Uncover which audiences are most engaged with demographic insights for networks, apps, programs, and brands

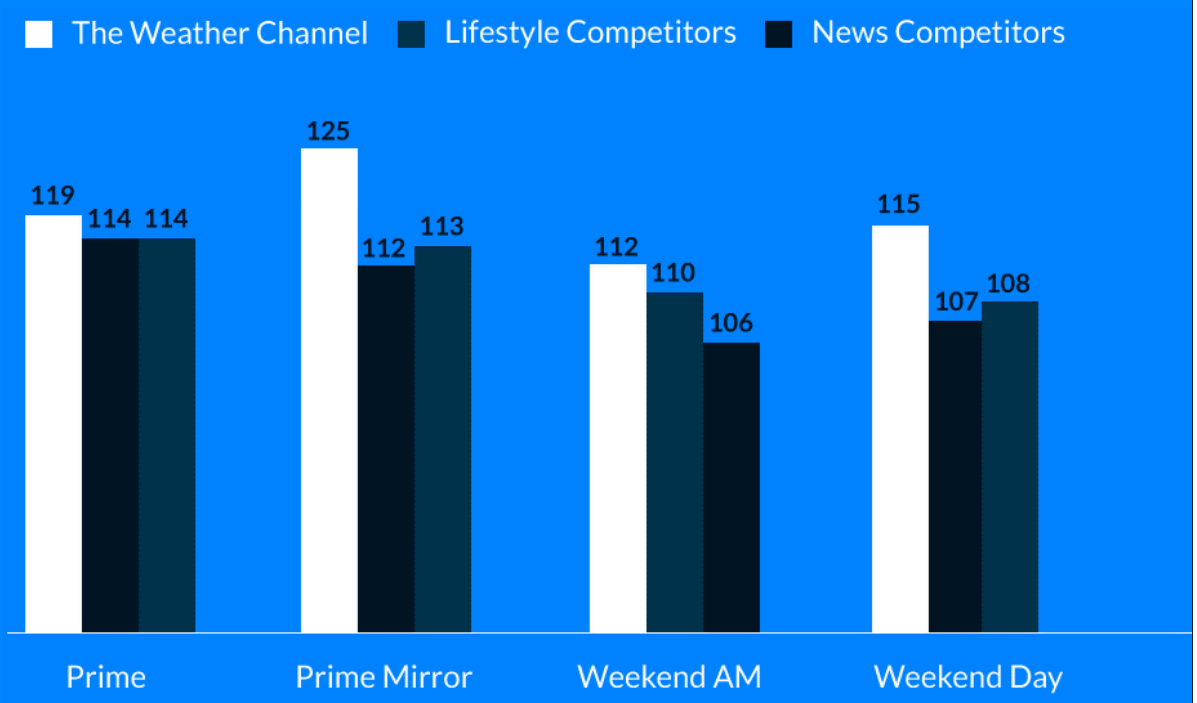
Benchmark & Distinguish Your Properties From Competitors

Gauge where you sit in the market with comprehensive insight into competitors across both linear and CTV.

Success Story

TVISION HELPS THE WEATHER CHANNEL PROVE VALUE

Media sellers at The Weather Channel tapped into TVision's engagement data to drive value for their ad inventory - illustrating how viewers 18+ pay more attention to both The Weather Channel's program and commercial time than they do to other Lifestyle and News outlets.



Answer Key Questions

Which brands will perform better on my properties?

Does my programming perform better on linear or CTV?

What co-viewing rate should I assume for CTV inventory?

How do differences in ad pods impact ad engagement?

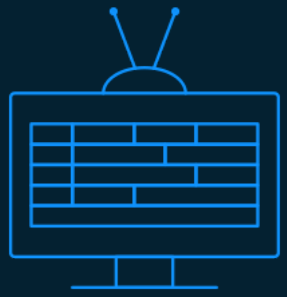
Which audience profiles pay the most attention to ads?

What other programs do my viewers watch?

Do viewers stay engaged through repeat airings?

What content types work best on which platforms?

The Industry's Most Comprehensive View of Linear and CTV



All National and Major Local Linear Networks and Channels

Hundreds of Apps Including CTV Walled Gardens

Thousands of Shows on Both Linear and CTV Platforms

Millions of Ads Across Linear and CTV

How We Help You Measure & Prove Audience Quality

TVision gathers second-by-second data from a nationally representative panel of households. Our in-home technology is capable of measuring everything that comes across the glass, both linear and CTV. Our deep library of ads and programs enables detailed measurement of what viewers are watching and engaging with. We also report which of our panelists are present in the room when the TV is on, and if they are paying attention.

Here's how it works:

1

We use ACR to match what's playing on the screen to our ever-expanding library of content and ads. We've cataloged thousands of hours of linear and streaming content from millions of program and ad impressions.

2

We detect which network, app, and/or streaming device is in use. Basically, if the content plays through the TV or a device connected to the TV, we capture it in our reporting.

3

We combine network, app, program, and device data with computer vision observations of our panel to report on viewer engagement across the entire TV landscape. Our unified linear and CTV reporting is unparalleled.

Learn more about how it works.

OUR PANEL OUR TECHNOLOGY

TVision Is Trusted By

View All

"With TVision's platform, we are able to identify how viewers are engaging with our premium programming and advertising.""

Scott Collins
President of Advertising Sales
AMC Networks

AMC NETWORKS

We Make it Easy to Get the Full Picture

TVision's Total View platform is organized into four easy to-use dashboards that provide detailed insight into how performance is changing over time and glean important competitive insights. Each dashboard contains insight into

unified linear and CTV data, competitive intelligence, ad & program time, and co-viewing.

PERFORMANCE SNAPSHOT

An executive summary of performance across TVision's core metrics for your network or app as well as your competitors. Discover:

- Benchmarks for Viewer Presence, Attention, and Co-Viewing
- Insight into what programs, genres, and advertisers are most engaging
- How engagement rates differ by age or gender

APP & NETWORK ANALYSIS

PROGRAM ANALYSIS

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Trusted By Top Brands & Media Platforms

CLIENT CASE STUDIES

Provide Clients With Trusted Post-Campaign Reporting

TVision's CTV Campaign Performance Reporting provides independent validation of the value your campaigns deliver. We illustrate your value by answering two questions, "How many people saw the campaign's ads?" and "Did viewers pay attention." Learn more about how we can we help you highlight the quality of your performance.

GO TO CTV CAMPAIGN PERFORMANCE REPORTING

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New Research & Resources

2025 Super Bowl: The Top Ads For Viewer Attention; Plus More Game Data from TVision

The Eagles beat the Chiefs in the game on the field, but which advertiser w...

CASE STUDY BLOG PRESS RELEASE

The TVision State of Streaming Report, January 2025

CASE STUDY BLOG PRESS RELEASE

Inscape and TVision Unlock Personified Cross-Platform Viewing Behavior for the TV Marketplace

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EXHIBIT 7

TVISION

THE TVISION SIGNAL

JUNE 2024 EDITION

Our Special Monthly Look at CTV Content & Viewer Trends

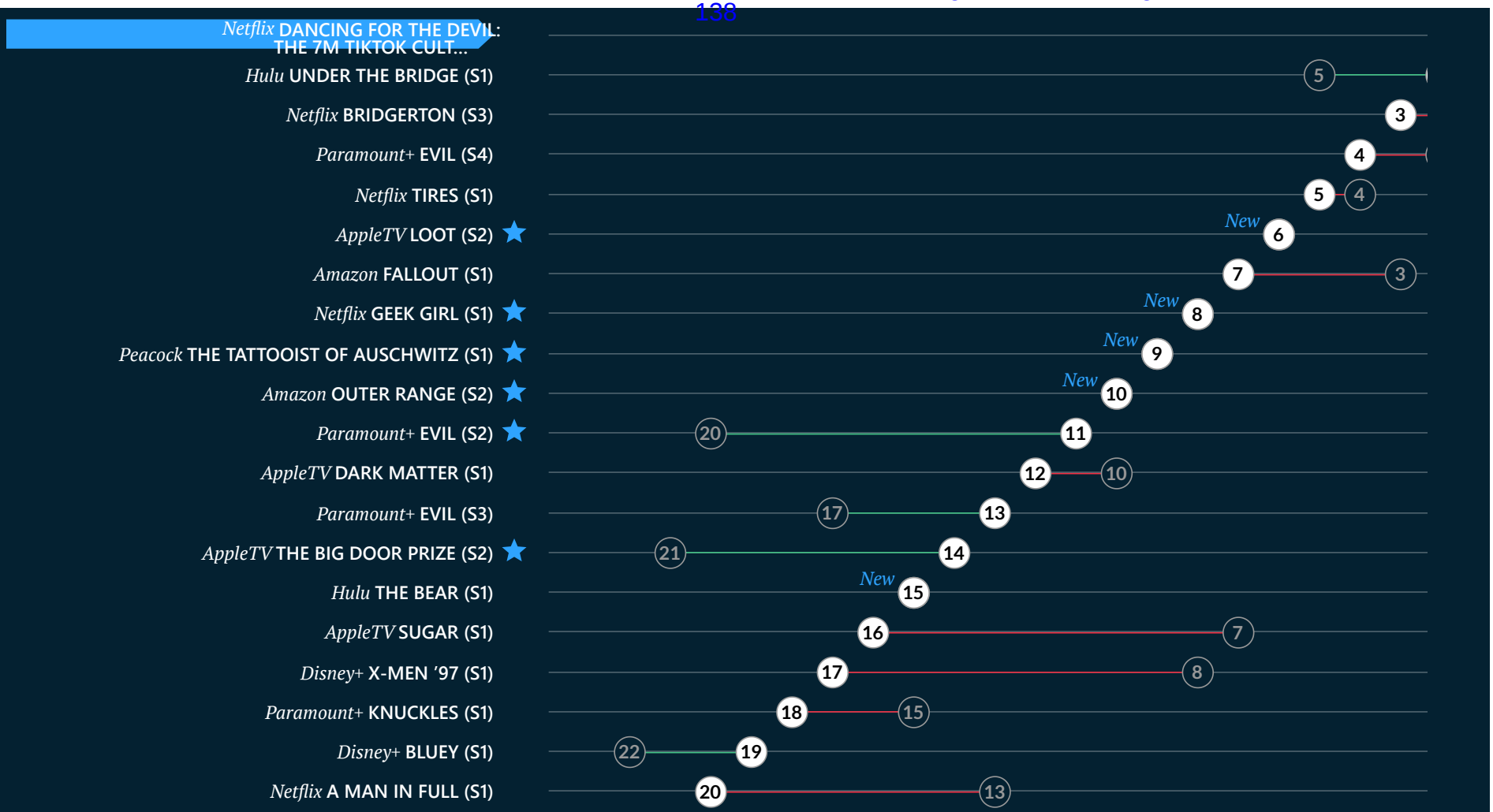
JUNE 2, 2024

Welcome to the June 2024 edition of the TVision Signal Report. In addition to sharing insight into the shows that are performing best across streaming apps in our weekly TVision Power Score, once a month we take a deeper dive into the viewer and content trends shaping the future of the CTV landscape. Want to find out which programs and apps are drawing in audiences and keeping them engaged? Or how viewers split their time between streaming and linear? Keep reading to find out!

Catch up on all of our past reports and check out our FAQs to learn more.

Top 20 CTV Shows of the Week

First let's examine the shows and movies that are ranking highest according to our signature TVision Power Score. Here are the shows that topped the Power Score list between May 27 and June 2, 2024 thanks to their ability to both attract viewers and hold their attention throughout the show.



Source: TVision Total View

"Dancing for the Devil: The 7M TikTok Cult" on Netflix took the top spot on the TVision Power Score, while season three of *"Bridgerton"* (Netflix) fell to the third spot. *"Under the Bridge"* from Hulu came in at number two. Netflix had five shows on the Power Score this week, and AppleTV had four.

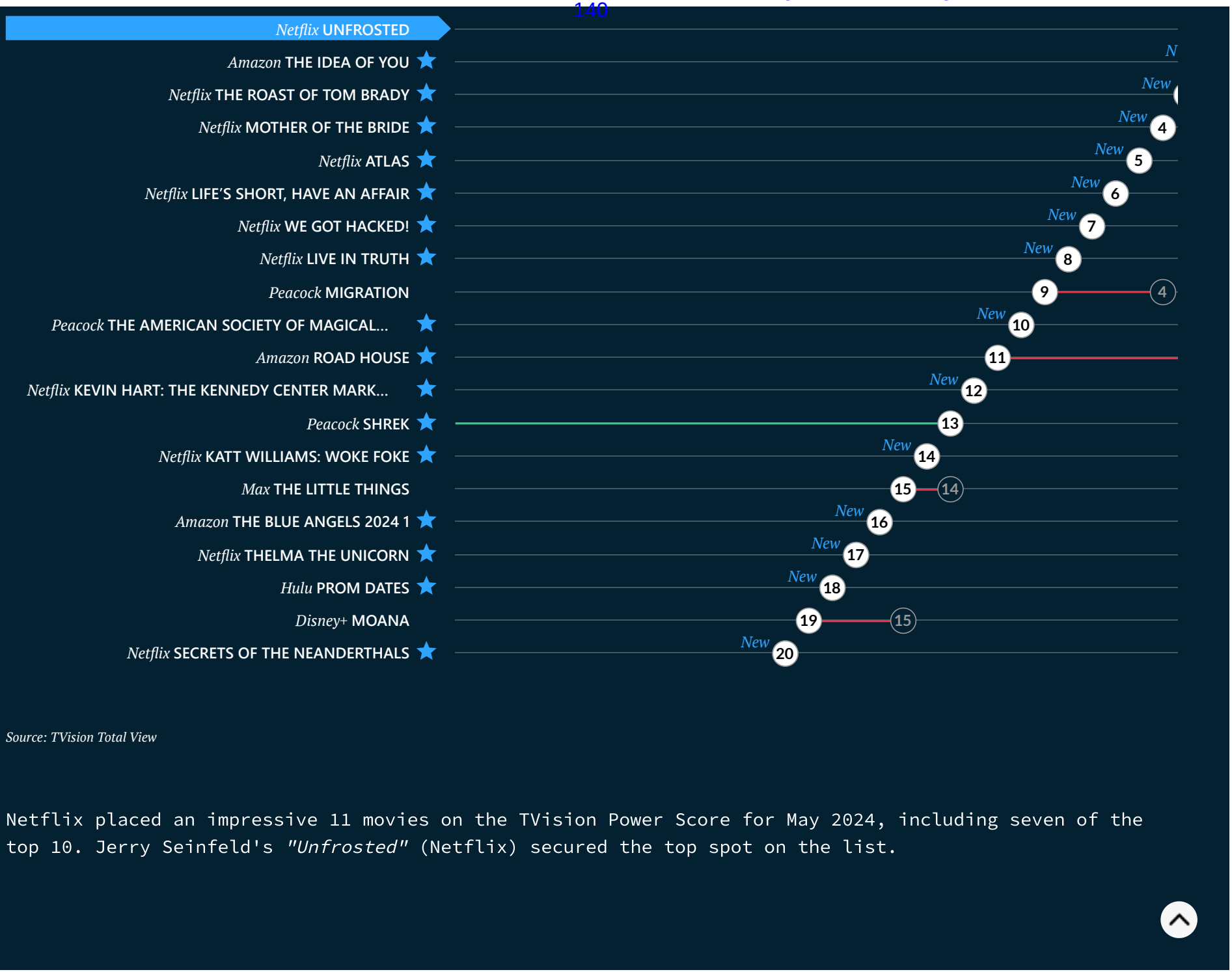
Top 20 CTV Movies of May 2024

Want to know which movies are best engaging viewers across all apps? Here are the movies that topped the Power Score list in May 2024.

THE TVISION POWER SCORE

Ranking the Top CTV Movies for May. 2024

● *This Month* ○ *Previous Month* — *Rank Decrease* — *Rank Increase* ★ *Trending Up*

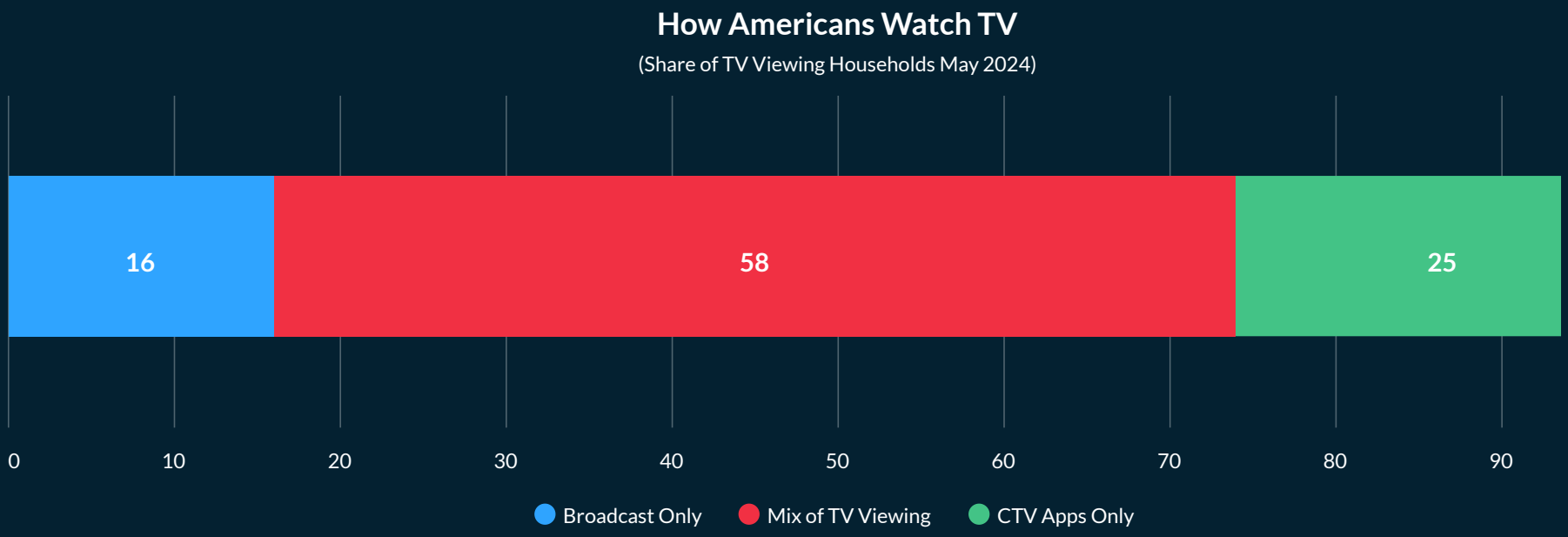


Source: TVision Total View

Netflix placed an impressive 11 movies on the TVision Power Score for May 2024, including seven of the top 10. Jerry Seinfeld's *"Unfrosted"* (Netflix) secured the top spot on the list.

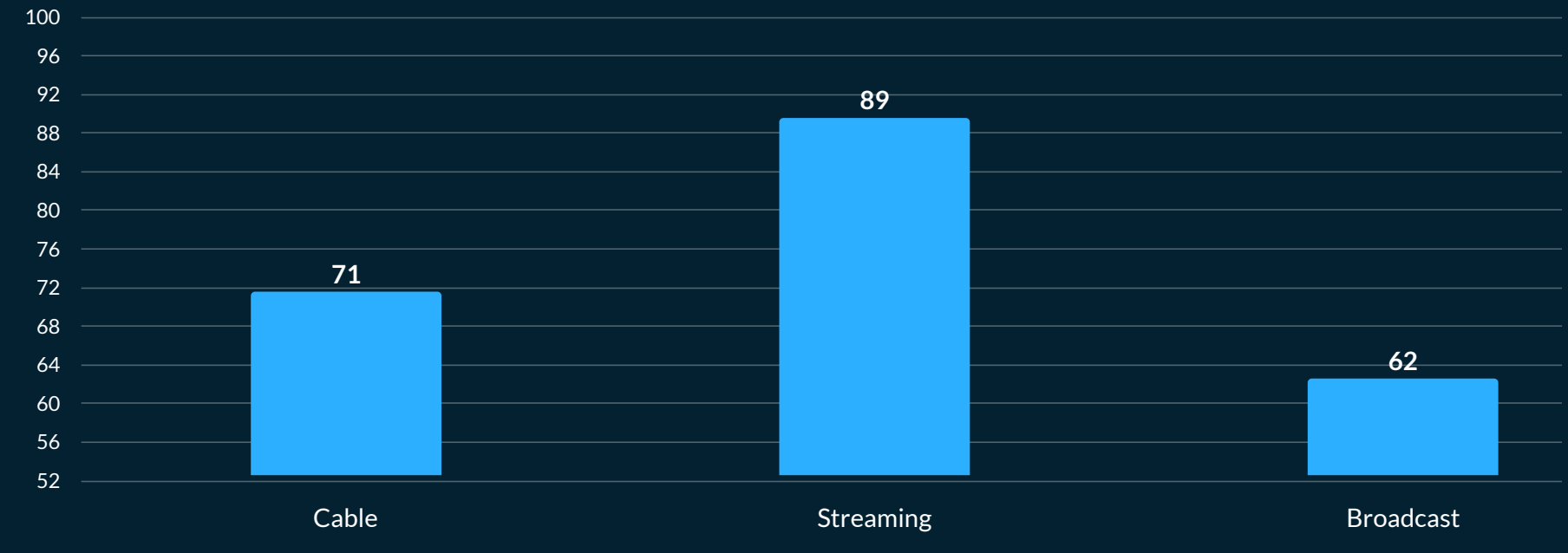
Viewers Watch Both Linear and CTV

In May 2024, a quarter of households watched CTV exclusively, but more than 58% of viewers tuned into both CTV and Broadcast.



Source: TVision Total View

In this section we examine household reach for Streaming, Cable and Broadcast. Most households continue to leverage all three.

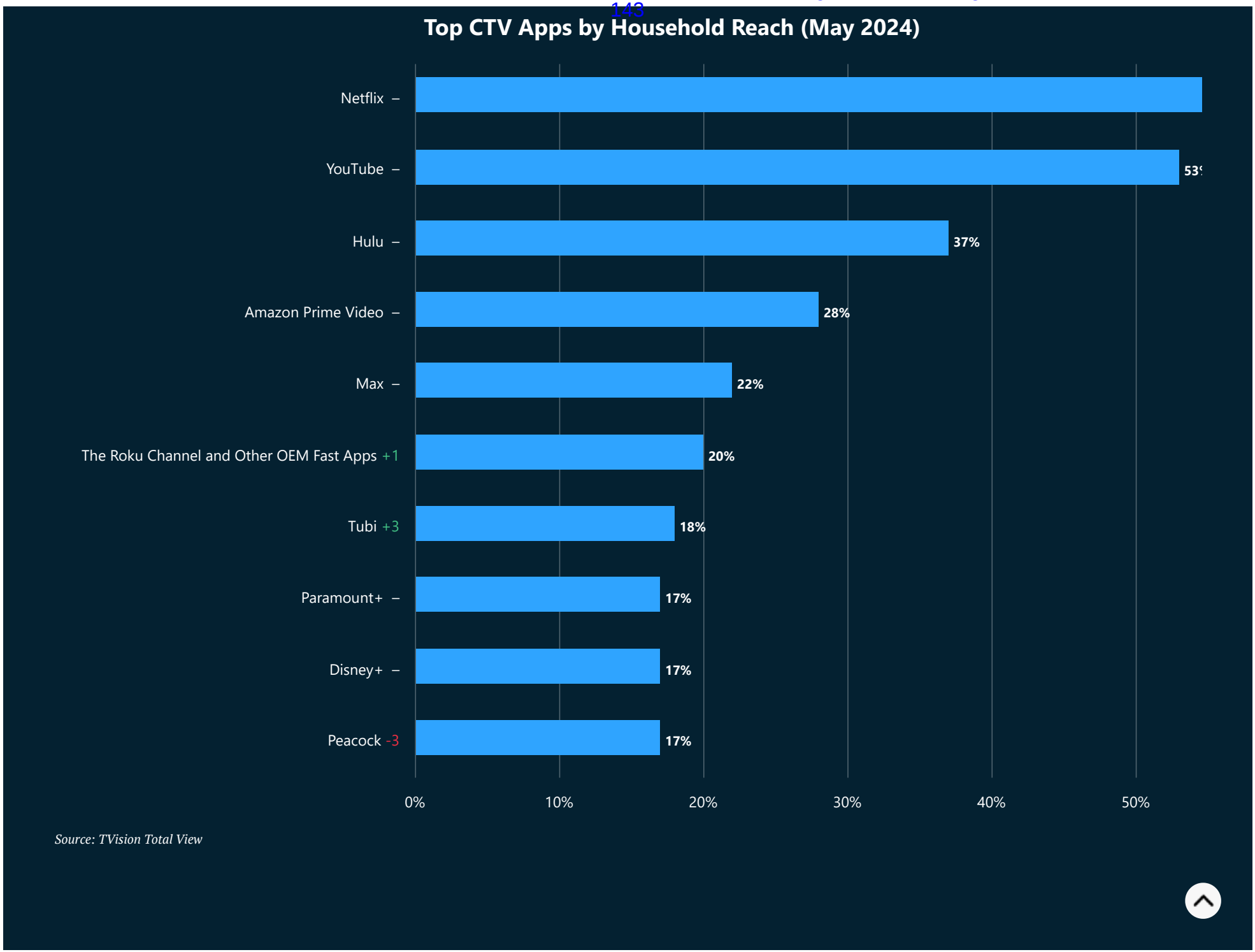


Source: TVision Total View

Note, Platform Reach indicates TV services households have viewed at least once within the specified time period.

The Apps On America's TVs

The top five apps in May 2024 for Household Reach are Netflix, YouTube, Hulu, Amazon Prime, and Max. The same five apps have maintained their same spots each month of 2024.



Source: TVision Total View

The CTV Content Types Engaging Viewers

Viewers watched movies 20% of the time, in May 2024, the rest of the time was spent watching episodic TV, and they binged 85% of the time they watched episodic programs.

Shows vs. Movies

80% Shows

20% Movies

Original vs. Syndicated Content

61% Original

39% Syndicated

Binged Shows vs. Weekly Release

85% Binge Release

15% Weekly Release

New Shows vs. Older Shows

21% New Shows

79% Older Shows

Want to learn more about the TVision Signal Report? Check out our FAQs here.

Take Action with TVision Total View

Want more insight into the most engaging programs across CTV? TVision has recently introduced Total View, the industry's most comprehensive look at person-level viewer engagement across both CTV and linear. With a unified view of the entire TV landscape, media sellers can identify premium impressions based on viewer engagement and show the true value of their media properties. Want to learn how you can gain key engagement metrics like attention and co-viewing for ad performance and viewer trends across hundreds of apps, networks, and thousands of shows? Contact us today to get started or request a demo.

LEARN MORE

Methodology & Metrics

TVision measures Viewer Presence and Attention for every second of programming and advertising on television. Every time a person walks into the room, our technology detects who the viewer is, where they are in the room, and what their eyes are looking at. We do all this without personally identifying individual users, and without transmitting any images or videos. TVision's data is collected from an opt-in panel of 5,000 homes across the United States and weighted to represent the country. All demographic data is self-reported by the respondents. Linear and CTV ad impressions data in this report is from May 1 - May 31, 2023 or May 29 - June 4, 2023, unless otherwise indicated.

About the TVision Power Score

The TVision Power Score is a completely new ranking designed to factor in both viewership and engagement when measuring the performance of CTV programming. The Power Score is based on the industry's most comprehensive view of the CTV landscape - TVision measures activity across over 1,000 apps - and enables an accurate understanding of the relative performance of CTV content across any app. This new way to understand show performance will enable industry watchers to more quickly identify trending content and CTV's hottest programming and even uncover hidden gems distributed through smaller apps.

The TVision Power Score factors in four key metrics: the amount of time viewers pay attention to the program, the amount of program time available for the season, the program's reach, as well as the application's reach. This combination of metrics was chosen to enable a neutral look at the quality of programming and its unique, inherent ability to draw in viewers - regardless of the scale of the platform, or the program's release schedule.

TVision Metrics

TVision Power Score: TVision's Power Score represents how engaged audiences are for any given program. Our formula looks at (Attentive seconds / Seconds Available) x (Program Reach per Season / Publisher Reach).

Share of Time Spent: Compares the distribution of time spent viewing the app or program relative to the selected variable.

Binge Release: Model in which multiple episodes in a season are released at the same time

Weekly Release: Model in which shows release one new episode in a season at a time over the course of several weeks

New Shows: Show has aired new episodes within the last 30 days Older Shows: Shows has not aired new episodes in the last 30 days

Original Content: Programs that are exclusive to a single platform

Syndicated Content/Streaming Library Content: Programs that airs on multiple CTV platforms or have their entire suite of content available.

Get the TVision Signal

Delivered to You

Subscribe to the weekly TVision Signal report, so you're the first to know which programs are topping the TVision Power Score rankings and other must-know CTV insights.

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EXHIBIT 8

OPINION: ON TV & VIDEO

TVision Insights: 'Ratings Only Tell Part Of The Story'

By Allison Schiff

MONDAY, MARCH 16TH, 2020 – 12:05 AM

If someone goes to the bathroom while a beautifully shot commercial plays full-screen on their TV, was it actually viewable?

Luke McGuinness, President & COO

TVISION INSIGHTS

Not so much, said Luke McGuinness, president and COO of TVision Insights, a TV analytics company that helps brands measure whether people are actually paying attention to their ads.

TVision, founded in 2014, started out by measuring attention on linear TV and moved into OTT more recently. It gathers its insights through a panel of 5,000 US homes, which represents roughly 14,000 people.

"Measuring viewability in the digital context is about whether an ad shows up in the field of view so that someone has the opportunity to see it," McGuinness said. "By and large, TV ads are showing up on the screen – but if no one is in the room to see them, they can't have an impact."

TVision clients include AB InBev, MARS, Microsoft, PepsiCo, Duracell, Google and Nestlé.

AdExchanger spoke with McGuinness.

AdExchanger: TVision in a nutshell is … finish that sentence.

LUKE MCGUINNESS: We're a data and analytics company that measures how people actually watch TV. If you're an advertiser spending $100 million a year on TV advertising and people are only in the room, say, 30% of the time and only a fraction of those people are actually paying attention – well, there's a tremendous opportunity there for advertisers to better optimize and allocate their TV dollars.

How are you like Nielsen, and how are you not like Nielsen?

We are like Nielsen in that we use a panel methodology, which is 100% opt-in, but we are unlike Nielsen in that we are creating a very different metric, although our data sets are actually complementary to ratings. But ratings only tell part of the story.

We found that ratings do not correlate at all to whether people are paying attention. We've seen highly rated shows with a fairly low attention rate, and plenty of shows with a relatively small but very engaged audience and low ratings. If you're trying to optimize your advertising schedule on TV, you need to understand both. It's not just about the size of the audience but whether they are present and engaging with ads when they air.

How does your technology work?

Our panelists put our device in their homes next to their TV. It's about the size of an Apple TV and it does three key things. First, we use ACR [automatic content recognition] to determine what someone is watching on the TV. Is it "The Voice," "Stranger Things," a specific commercial?

Then we detect how the content got to the screen, whether the person is watching through live cable, the Hulu app, a Roku device, the NBCU app on Chromecast, whatever it happens to be. And then, third and most critically, our device has a camera. The technology only processes images – no video – to determine if there is anyone in the room and, if so, who. It recognizes the specific person, associates their demographics and can tell if they're paying attention to the TV or not.

How do you define attention?

Attention is our metric for engagement. We look to see whether the TV is on, which is akin to every other TV data provider out there. But then we also look at viewability, which means that the TV is on and there is at least one person in the room. Attention goes one step further: The TV is on, someone is in the room and they're actually looking at the TV. We collect this second by second but we use the MRC standard for digital video, which is two continuous seconds.

Is TVision accredited by the Media Rating Council?

We may at some point pursue accreditation, although we're not currently in the process. But we did partner with a company called Neutronian, which recently launched as a neutral auditor for data quality. They conducted a thorough audit of what we do and certified our practices as sound.

Your device relies on ACR technology. How do you deal with privacy concerns?

Our panel is 100% opt-in. Our panelists are signing nine-page contracts in order to opt in and we're very forthright in explaining how the technology works when we recruit them. We also architected our technology so that all of the data is processed on the device in the panelist's home. We're not pulling any audio or video into the cloud. Only summarized data comes back to us from the device.

How can advertisers use your data?

One way is as a complement to their existing ratings and CPM data as they head into upfront planning to optimize their TV investment for people who actually see and engage with their ads.

Some use our data to see how well attention correlates with the way they measure the outcomes of their advertising. For example, we have clients that look at brand lift on a weekly basis to measure brand health and awareness, but they never had a good way of understanding what is driving increases or decreases in awareness. Turns out when people pay attention to ads, brand lift tends to go up, and if they don't, it tends to go down. Seems logical, but they had no way to measure it.

The next logical step is to optimize for attention, for whichever networks, dayparts or specific shows their audience tends to be more engaged with. It's about allocating dollars and negotiating more effectively.

Will we have a truly data-driven upfront season this year?

Over the last couple of years, there has been the start of an evolution toward advertisers using different data sets to measure the effectiveness of their TV buys, including the amount of attention people pay to their ads. Changes won't happen overnight, but there has been an acceleration in the pace of change, which has to do, at least in part, with consumer adoption of streaming.

We're seeing more flexibility and willingness on both the buy side and the sell side to work with each other and with new data sets.

This interview has been edited and condensed.

NEXT IN ON TV & VIDEO

It's Time For B2B Marketers To Get Off The Advanced TV Sidelines

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TripleLift CEO Dave Clark Abruptly Exits After Setting The SSP On A New Trajectory

Dave Clark, who's led TripleLift for the past two years, is stepping down, effective immediately, and is being replaced by a coterie of TripleLifters.

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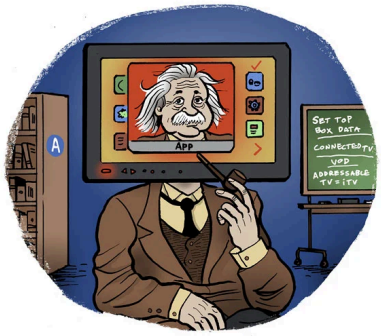

Smart TV

CTV

75% Of All CTV Transactions Are Programmatic

Business outcomes are now the most important KPI for determining success with digital video, according to the IAB's annual report.

3

DATA PRIVACY ROUNDUP

Why This Googler Left The Privacy Sandbox For RTB House

Sophia Cao, RTB House's newly appointed director of private advertising advocacy, knows how to play nice in the sandbox – because, well, she used to work there.

4

MARKETERS

How One DTC Startup Is "De-risking" Its Business As It Prepares For A Potential TikTok Ban

CAKES body, a DTC startup that launched in early 2022 selling self-adhesive nipple covers, is diversifying its media mix to "de-risk" its business as it prepares for a potential TikTok ban in the US.

5

AGENCIES

Brian Lesser Is The New Global CEO Of GroupM

If you were wondering whether Brian Lesser was planning to take some time off after handing the CEO reins of InfoSum to Lauren Wetzel last week – here's your answer.

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EXHIBIT 9

AdAge - TVision is the go-to-choice for several Nielsen rivals

August 30 | Blog | Insights | News

*"**TVision**, a firm that originally built a panel to measure people's attention to ads, **has become the go-to choice for several Nielsen rivals** -- including VideoAmp, iSpot, Xandr and 605 -- who need person-level data to calibrate the household data they track using millions of smart TVs, set-top boxes and other devices."*

AdAge Editor Jack Neff breaks down Nielsen's decision to pause accreditation with the Media Ratings Council in his feature *"Nielsen Audience Measurement Hiatus Tests Media Ratings Council Relevance."* He examines the potential impact of that decision on the MRC, the industry, and Nielsen itself.

Neff points out that TVision is emerging as the critical partner of Nielsen competitors for person-level data. As big data rivals look to replace or augment Nielsen data as the currency standard for networks and advertisers, they are validating their census data with TVision's person-level panel data.

Neff writes, "Networks have been asking Nielsen competitors to provide person-level data, and licensing TVision's panel data could help competitors solve these problems."

Find more information about TVision's Advanced Audience Projections, person-level data solution here.

More resources from TVision

BLOG

New State of CTV Advertising Report from TVision and DoubleVerify Shows Viewer Attention to CTV Advertising is on the Rise

Research from TVision and DV shows CTV Ad Attention is on the rise. A new report helps advertisers identify the best CTV opportunities across dayparts and pods.

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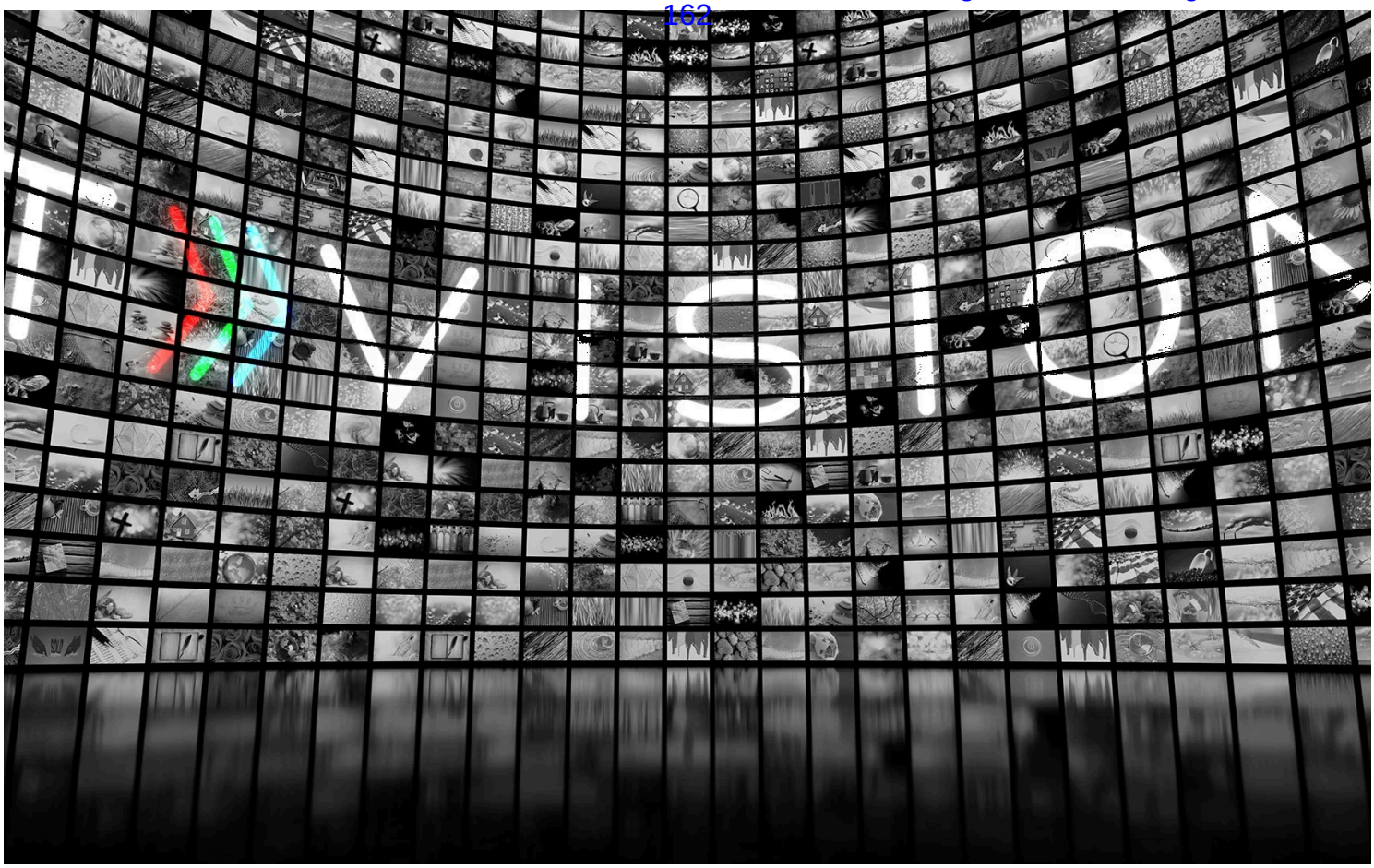

BLOG

Fubo Exceeds Audience Attention Benchmarks for Streaming Platforms and Linear TV According to Attention Data from TVision

Research from TVision shows ads on Fubo captured 35% more attention than ads on CTV in general, among 25-54 year-old viewers

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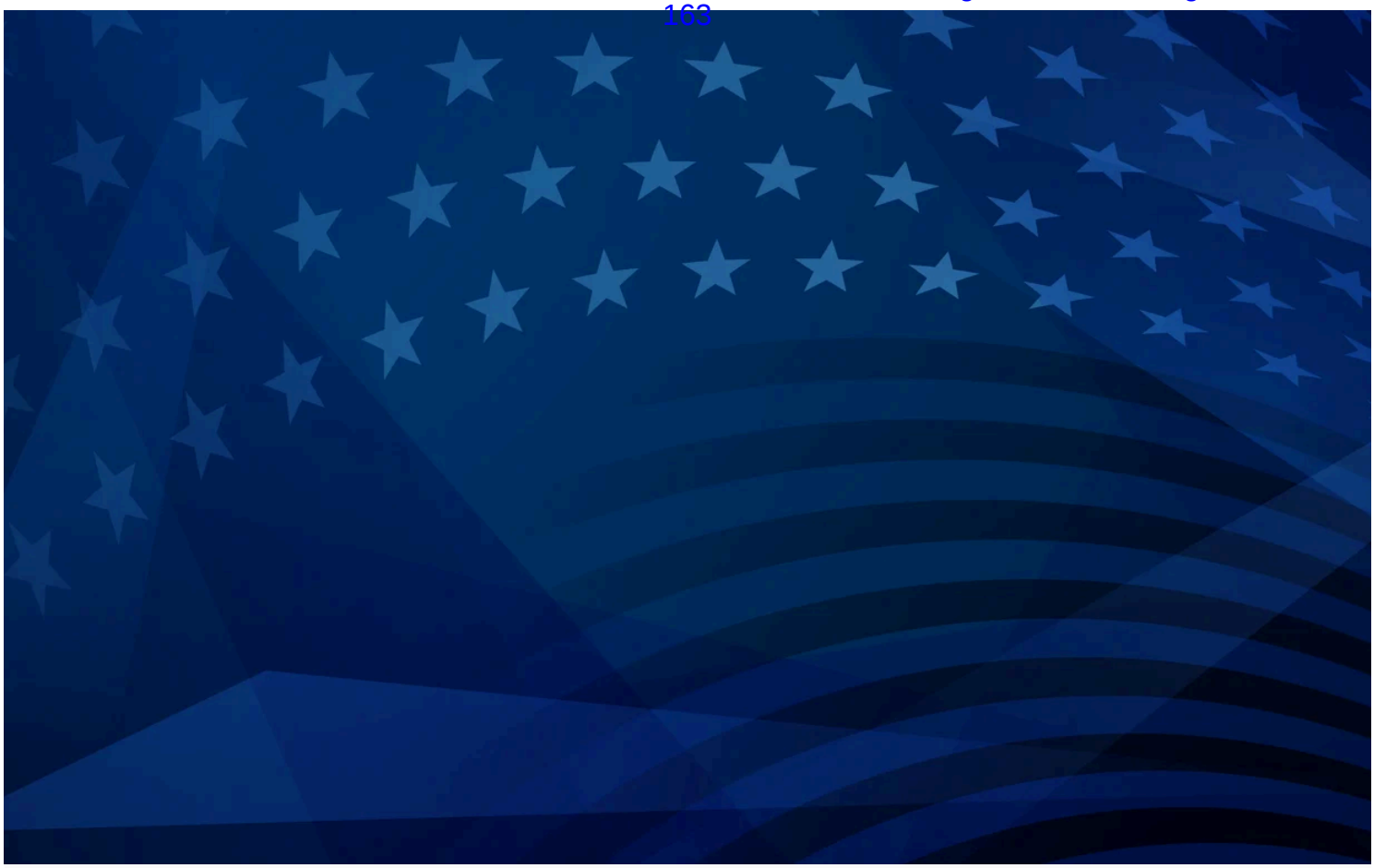

BLOG INSIGHTS

Who's Paying Attention to Political Ads Right Now?

TVision analyzed viewer attention and in-room presence by political party and age, across both CTV and linear TV viewing from September 1, 2023 - February 29, 2024 to understand how viewers are engaging with political ads.

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EXHIBIT 10

TVISION

WE'RE MODERNIZING TV MEASUREMENT

We answer questions about who's engaged and watching content or ads on TV, when, where and how

GET IN TOUCH

Our Mission

At TVision, we're focused on driving a universal measurement standard for the future of video.

Driving Change in TV Measurement

While TV viewing behavior has rapidly evolved, TV measurement standards have essentially remained the same since the advent of ratings in 1950. TV measurement certainly hadn't kept pace with the detailed, value-based insights available in digital media. But all of that is changing - TVision is providing the fulcrum for the industry's tipping point.

TVision's cutting-edge computer vision technology gathers second-by-second data from a nationally representative panel of households. Our person-level insights are critical components driving innovation at the major providers of alternative currency for TV measurement. Measurement leaders like iSpot, VideoAmp, and Oracle all trust TVision data.

TVision is also providing brands and agencies insight into ad attention and viewability - which are recognized as cross-platform KPIs that enable marketers to understand the value of advertising across multiple media platforms - including TV, CTV, and digital. Some of the largest brands in the world, top media networks, and streaming applications access TVision's TV engagement metrics.

We Report How People Really Watch TV

What program or ad is playing on the TV

How that conent is getting to the TV

Which individuals are in the room

If they're paying attention to the TV

TVision is Trusted By

VIEW ALL

"TVision is now an integral part of our measurement ecosystem."

Paolo Provinciali
Head of US Media
Anheuser-Busch

"Attention is informing buying decisions at brands and agencies, so it's powerful for our sales team to have this data to share."

JT Peace
Associate Director of Ad Sales
The Weather Channel

"I believe that TV
future of TV mea
someone is prese
think those are p
have."

Joanne Leong
VP, Director, C
Dentsu Aegis Ne

Our People Are Our Greatest Asset

TVision is home to engineers and data scientists, analysts and product owners, marketers and account leads, business managers

HELP US BUILD SOMETHING GREAT

and operations experts. We're a group of bright, passionate, and innovative individuals from many different backgrounds. Together, we're shaping the future of TV measurement.

MEET THE TEAM

We're always looking for smart, passionate people who think outside the box.

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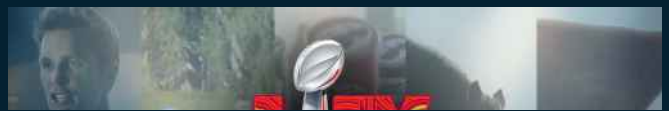
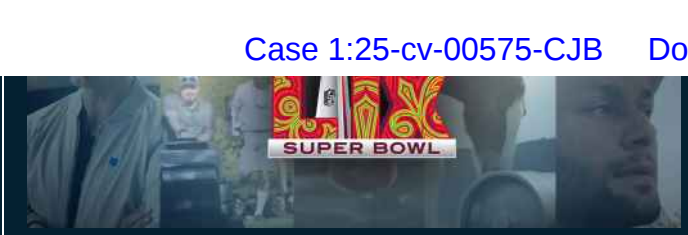
New Research and Resources





INSIGHTS

2025 Super Bowl: The Top Ads For Viewer Attention; Plus More Game Data from TVision

TVision reveals the top ads based on attention from the 2025 Super Bowl, how viewers watched the game, which demos paid the most attention, whether Kendrick Lamar kept viewers' attention, and more.

BLOG

The TVision State of Streaming Report, January 2025

The latest TVision State of Streaming gives advertisers and the media industry important insights into app penetration, engagement - and for the first time - identifies share of streaming ad time across apps. Read the full report for more insights in app engagement, analysis

BLOG

Inscape and T Personified C Behavior for t

VIZIO's Inscape currency-grade

In The News

NEXTTV 05/24/2023

Ted Lasso Again Takes Top Spot in TVision Power Score

Netflix has seven shows in top 20.

NEXT TV 05/18/2023

Ted Lasso Takes Top Spot in TVision Power Score

Apple TV Plus series Ted Lasso climbed to the top of TVision's Power Score rankings for shows on connected TV for the week of May 8.

MEDIA POST 05/11/2023

Among Streamers, Netflix and YouTube Lead for HHR, According to TVisi

Netflix and YouTube offer up the best TV U.S household reach, with a 53% and 52% reach numbers respectively, according to TVision estimates.

VIDEO WEEK 05/08/2023

Can Attention Metrics Impact Outcomes?

Last month Lumen and TVision, two leaders in the attention measurement space, announced a new partnership which combines their two datasets, enabling advertisers to plan and track their campaigns based on attention data collected by the two companies.

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10/31/2024

TVision Expands to 35 DMAs; Now Covers More DMAs than Any Other P Provider

CIMM and TVision Explore Potential for Age-Based Bias in Active Meter A Panels, Compared to Passive Meter Panels

Study callsfor greater transparency into methods and modelling cor

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EXHIBIT 11

4 challenges the industry will face as it breaks away from Nielsen

by Alison Weissbrot | *September 01, 2021* | The Information

The door is open for a new era of TV measurement — but can the industry thrive on multiple currencies?

When NBCUniversal last week put out an RFP for measurement partners, it was the biggest sign yet that the industry has lost faith in Nielsen.

The RFP came after Nielsen put its Media Ratings Council (MRC) accreditation on hiatus after undercounting household viewership during the pandemic. The MRC, run by George Ivie, is a

trusted independent industry body formed in 1964 with a stated mission "to secure for the media industry and related users measurement services that are valid, reliable and effective."

The service is the third from Nielsen to lose MRC accreditation in the past year, including its Digital Ad Ratings (DAR) service, which it paused in October 2020, and local TV ratings, which it suspended in January.

Nielsen has placed its bets on Nielsen One, the cross-platform measurement framework it has promised to roll out in full by 2024. But stakeholders across the industry agree that 2024 is far too long to wait, given how quickly consumer viewing habits shifted during COVID, and especially now that Nielsen is no longer an accredited service.

Buyers began to move away from just using Nielsen for planning purposes years ago. VideoAmp, for example, powers Omnicom's TV planning tools, and from what I hear, is about to kick off a major test with holding companies after Labor Day to see how its currency matches up against Nielsen's. Sellers are looking for new partners as well; Comscore, for instance, is growing its remit with ViacomCBS.

Still, Nielsen gross ratings points (GRPs) remain the only independent TV currency in the market. Most buyers and sellers I've spoken with agree that NBCU's bold move is, for lack of a better term, the kick in the butt the industry needs to finally move forward.

But they're also waiting with bated breath for the massive changes, complexities and periods of confusion leading up to the new world order.

1. Juggling multiple currencies

Industry stakeholders agree that transacting on multiple currencies that correspond to advertiser business outcomes is the way forward. Jo Kinsella, president at TV measurement company TVSquared, pointed to the stock market, which trades on multiple currencies, such as futures and options, as an example. Similarly, she says, advertisers can transact on various branding and performance metrics.

Buyers are becoming more open to transacting against multiple currencies, says Michael Perlman, chief revenue officer at TVision, a TV measurement company that tracks attention. TVision

recently worked with AB InBev, for example, to buy ads off of guaranteed attention metrics on A+E Network.

“There is room for multiple players,” he says. “The goal of a particular campaign could dictate the right approach for deploying media.”

Media buyers, however, are hesitant. Some worry that using multiple currencies will obscure the methodology to work in the networks’ favor, which can choose to transact against whichever currency values their inventory the highest. Multiple currencies will also make it difficult to compare ratings across networks. And, agencies must deliver on strict pricing and savings guarantees from procurement, and multiple currencies could make it difficult to reconcile costs.

2. Getting stakeholders on board

While the industry applauds NBCU’s bold stance, you’d be hard pressed to find a buyer that wants a major media seller determining TV’s future currency.

Media buyers agree that any new currency adopted must receive cross-industry input and approval, as well as third-party accreditation from an independent body (most likely the MRC). Otherwise, as one buyer put it, the currency will feel “rigged.” Another buyer pointed out that it will be difficult to make the case to clients to move away from Nielsen to a new currency dictated by a media seller.

Collaboration, however, is easier said than done; getting two parties on opposite sides of a transaction to agree is tricky. Many are banking on the MRC to endorse and validate a new currency as an independent body.

But the jury is still out on whether the MRC has the appetite to create new types of accreditation for multiple currencies. As one sell-side spokesperson said, if they don’t do it, “I don’t know who steps in.”

3. Understanding demos

Despite Nielsen’s issues, it’s still the largest independent panel backed by demographic household data. The Nielsen panel, though imperfect, provides a critical foundation for understanding who is

watching certain types of content, beyond just what is being watched.

There are, however, rising alternatives. TVision has a 15,000-person panel that tracks not just who is in the household, but also who is watching what, using facial recognition and eye tracking technology along with automatic content recognition (ACR) data. Many Nielsen contenders are licensing TVision's dataset to underpin their systems with demographics.

As the industry slowly moves away from broad, demo-based buys in favor of outcomes, Nielsen's panel may wane in importance. As one media buyer put it, demos become arbitrary when you can measure actual sales or business goals.

4. Moving past buy-side inertia

This, in my opinion, is the most significant hurdle, and it's what has held the industry back from adopting a new currency for years. As one media buyer put it, the challenge is large and "people hope it will get solved for them."

Nielsen's historical data backs into most clients' planning processes and helps them determine volume discounts and pricing. Demand and planning haven't evolved to rightsize pricing, as clients continue to rely on old media mix modeling formulas that are no longer accurate. Even just starting to translate Nielsen currencies to a new baseline of truth would be problematic for many clients.

Another barrier is cost. Agencies spend vast amounts of money with Nielsen (one buyer estimated the costs come in just behind rent and employee salaries). If the industry were to adopt multiple currencies, costs could skyrocket, and it would be difficult for agencies, already with razor-thin margins, to offset those costs to clients.

While tough, most agree these challenges are not insurmountable. Ready or not, the next era of measurement is upon us.

Tags

Campaign Savvy | Opinion

Campaign_US

CampaignLiveUS

Up next: **1-3 of 7**

Kraft Heinz taps Todd Kaplan as chief marketing officer of North America

Time is a precious resource i Delta's Olympics campaign

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EXHIBIT 12

TVISION

SINGLE-SOURCE, PASSIVE MEASUREMENT OF TV

TVision's demographically representative, passive TV measurement panel enables accurate, person-level insight into how people really watch both linear and CTV

GET IN TOUCH

5,000
Homes

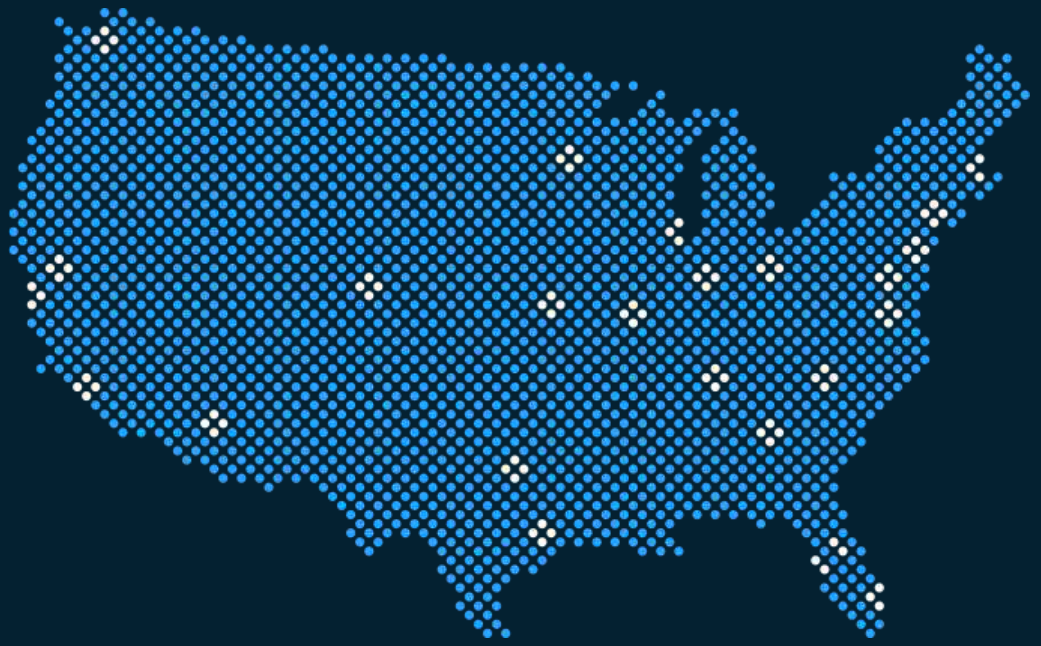
13,000
People

24,783,972,198
Seconds of TV viewing

For the Love of TV

Our panelists are helping the industry - networks, apps, advertisers, and measurement providers - understand who's watching what, when and where on TV. Their participation informs everything from the TV content that is produced to the ads that are made.

We recruit panelists from top DMAs in order to represent a wide cross-section of viewing behaviors and demographics. Our panel is 100% opt-in - all of our panelists are compensated for their participation.

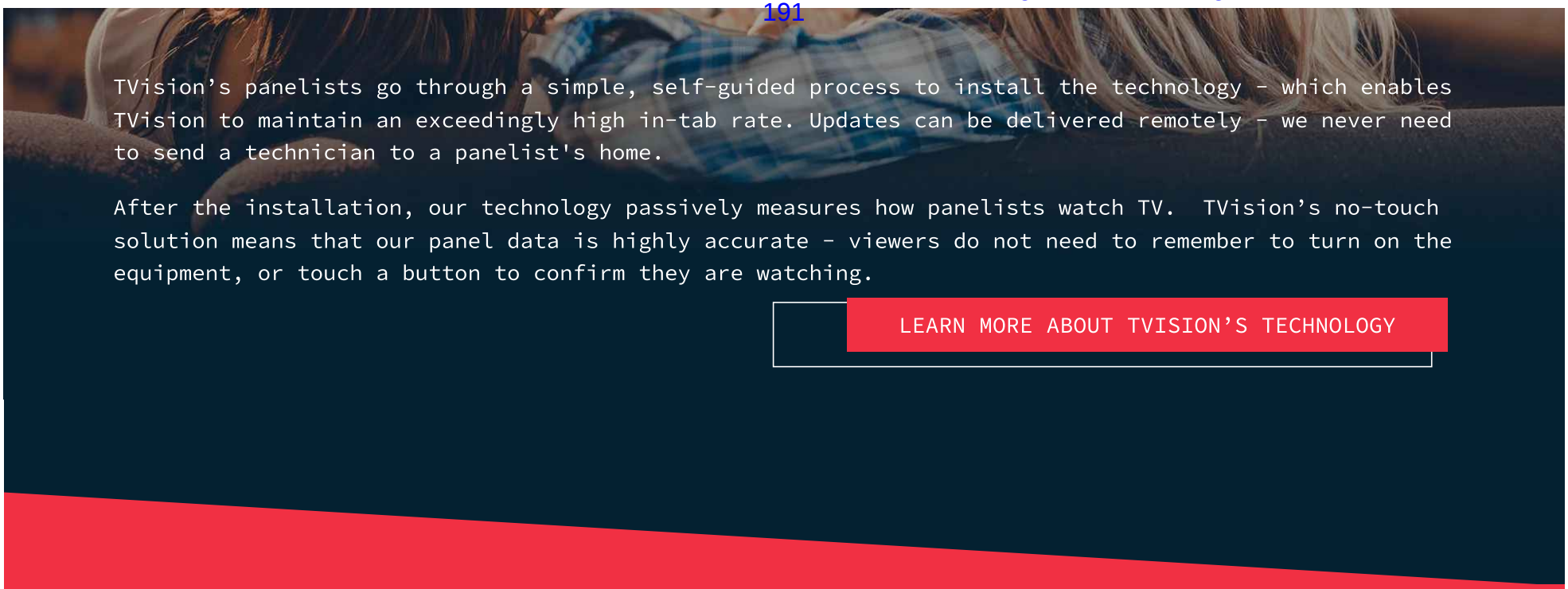


Trust and Privacy are Paramount

TVision could not operate as a company without the trust of our panelists. We are fully transparent with our panelists about how and what data we collect.

Panelists install the technology, and after an initial training period all data leaving the panelists' home is completely anonymous. The viewing data leaving the house is a simple text file referring to the household and viewers by numbers not names, aggregated and weighted to be nationally representative before being shared in our reporting platforms.

High In-Tab Rates and Passive Data Collection Support Accurate Measurement



TVision's panelists go through a simple, self-guided process to install the technology - which enables TVision to maintain an exceedingly high in-tab rate. Updates can be delivered remotely - we never need to send a technician to a panelist's home.

After the installation, our technology passively measures how panelists watch TV. TVision's no-touch solution means that our panel data is highly accurate - viewers do not need to remember to turn on the equipment, or touch a button to confirm they are watching.

LEARN MORE ABOUT TVISION'S TECHNOLOGY

TVision is Trusted By

VIEW ALL

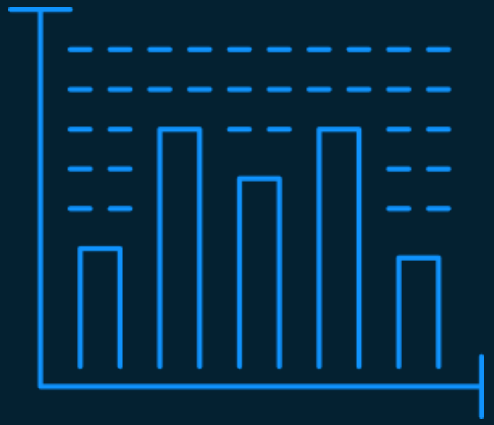
"Nielsen and TVision both have relatively the same coverage across markets, and the sample sizes are very close in terms of total size, which won't make that big of a difference in terms of accuracy for how the industry is using this data to model people."

NBCU statement to Ad Age

Our Innovative Panel Delivers What the Industry Needs

Person-Level Viewing

Big data sets are powerful in their scale, but are often limited to reporting household-level data. With TVision as a calibration panel for person-level data, alternative currency



Single-Source for Linear TV and CTV

Because TVision reports on both linear and CTV viewing from the same single-source panel, media sellers and advertisers can make apples-to-apples comparisons of engagement

Attention and Viewability Metrics for TV

TVision's panel allows us to go beyond "Is the TV on" to understand if people are in the room and actively engaging with the content. After all, we all know that ads work best if people are

providers are accurately reporting on the true audience size of programming across linear TV and CTV.

and performance across all TV viewing, even the CTV walled gardens.

paying attention, and people will only watch programming if it is engaging.

INTERESTED IN BECOMING A TVISION PANELIST?

Learn more at MyTVPanel.com

Get in Touch

Need more info, have a question or want a demo? Tell us a little bit more and we'll respond shortly.

FIRST NAME:*

LAST NAME:*

COMPANY:

EMAIL ADDRESS:*

TELL US HOW WE CAN HELP. (OPTIONAL)

AREA OF INTEREST:

- [ ] BRAND & AGENCY SOLUTIONS
- [ ] NETWORK & STREAMING SERVICE SOLUTIONS
- [ ] MEASUREMENT & DATA SOLUTIONS
- [ ] TVISION PANEL SUPPORT
- [ ] MEDIA INQUIRIES
- [ ] MEET US AT EVENTS
- [ ] JOBS AT TVISION
- [ ] OTHER

- [x] YES, SEND ME TVISION NEWS AND CONTENT.

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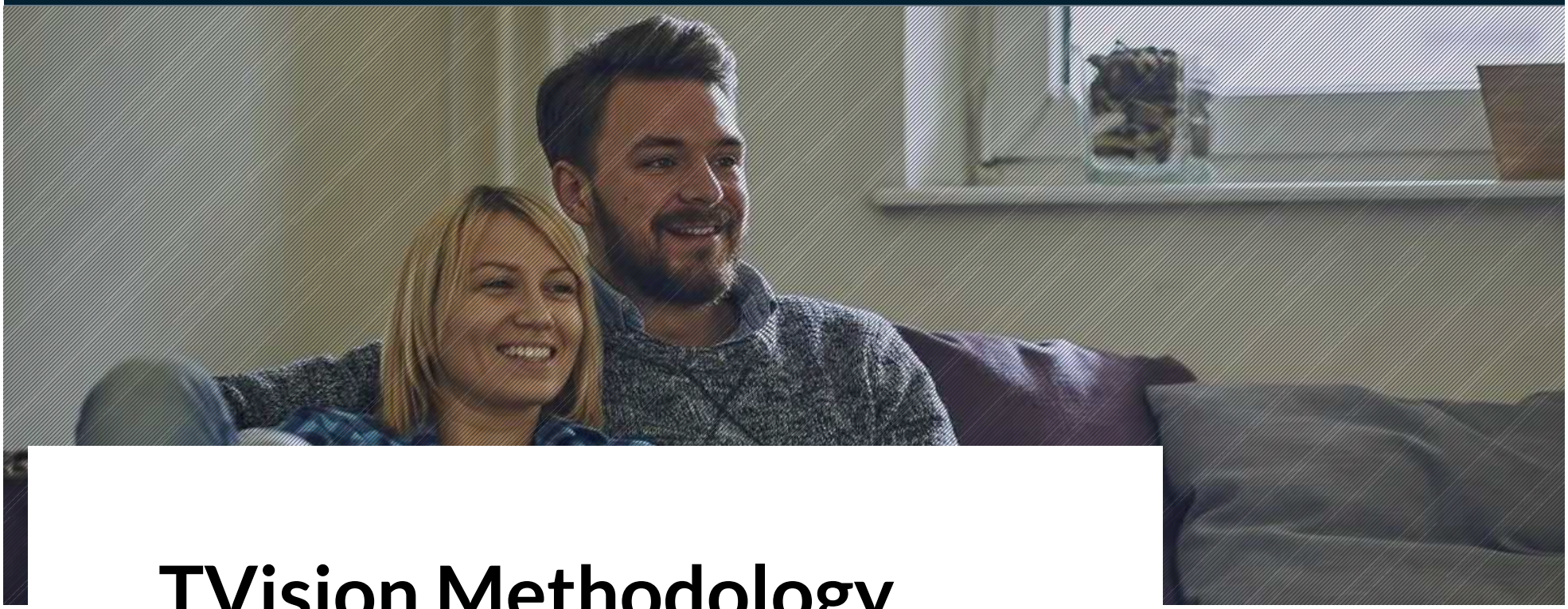
Privacy Policy | TVision Japan

EXHIBIT 13

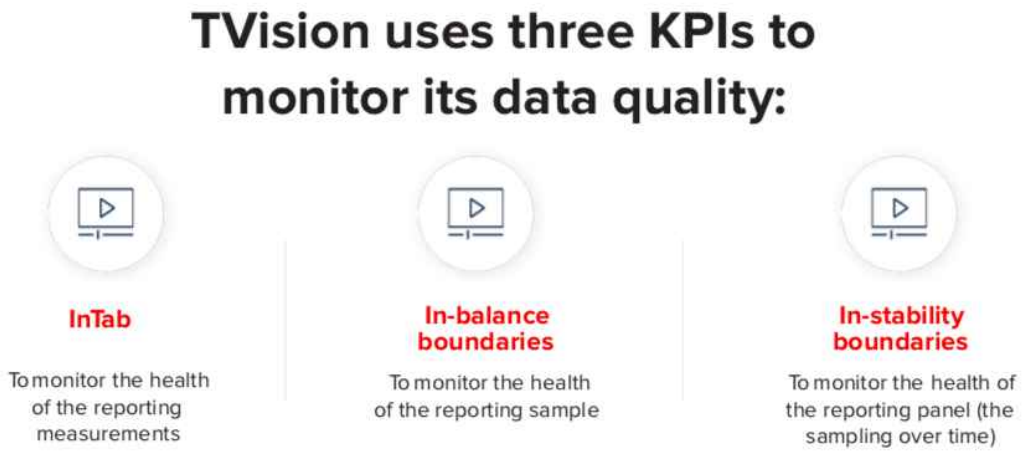


TVision Methodology Overview

By TVision | March 10

TVision measures and reports on television viewability and attention in the USA and several international markets. Behavioral viewing data - what people are

watching, who is in the room, as well as if and when they are paying attention - is collected from an opt-in, privacy safe panel. TVision uses cutting edge technology to measure person-level movements, and interprets the audio from the television to determine what content is being shown.



ABOUT OUR PANEL

TVision recruits households from across the country. Six household characteristics and five individual characteristics are used to ensure panelists in the Northeast, South, Midwest, and West proportionately represent their market areas. These characteristics are used to project television activity and viewing behavior for the total US population. TVision uses the US Census and annual updates from the American Community Survey (ACS) to define population universe estimates (UEs) for each characteristic. In order to properly project television activity and viewing, TVision applies a daily weighting methodology, so both single-day and multi-day projections remain consistent and representative.

MEASUREMENT

In panel homes, TVision monitors television sets and individuals near the television sets second-by-second to determine:

- **Presence** - the amount of time that a viewer is in the room during a piece of content.
- **Attention** - The amount of time that a viewer is looking at the TV screen during a piece of content.

Panelists set up the device near the TV to pick up its audio signals. The microphone array on the device collects audio fingerprints that help to identify the content that is playing through the TV. These fingerprints are compared with program and ad databases, and logged as such. This data is centrally maintained in TVision's event data storage.

Individual viewing behavior is monitored with optical sensors in panel homes. The sensor signals are processed to identify the specific individuals who are in the room while the TV is on. It also captures when individuals are looking at the TV (attention). This viewing and attention data is centrally maintained in TVision's event data storage. Viewing data is matched to content data to obtain the final metrics. No video streams are stored on the device or transmitted back to TVision.

INTAB

TVision evaluates the quality of data from every panel household every day. Households where the monitoring equipment and software are functioning

properly within defined fault tolerances are qualified and included in the daily InTab. Households that fail to meet fault tolerance thresholds for specific days are not included in that day's InTab.

PANEL PRIVACY & SAFETY

TVision's in-home panel is 100% opt-in and privacy-safe. TVision policy prohibits any audio and images from leaving the home once a household is InTab. If equipment is removed from a home for any reason, any personal data is deleted.

For more detailed information about TVision's methodology, please contact us.

TV and CTV Attention Report

More resources from TVision

INSIGHTS

2025 Super Bowl: The Top Ads For Viewer Attention; Plus More Game Data from TVision

TVision reveals the top ads based on attention from the 2025 Super Bowl, how viewers watched the game, which demos paid the most attention, whether Kendrick Lamar kept viewers' attention, and more.

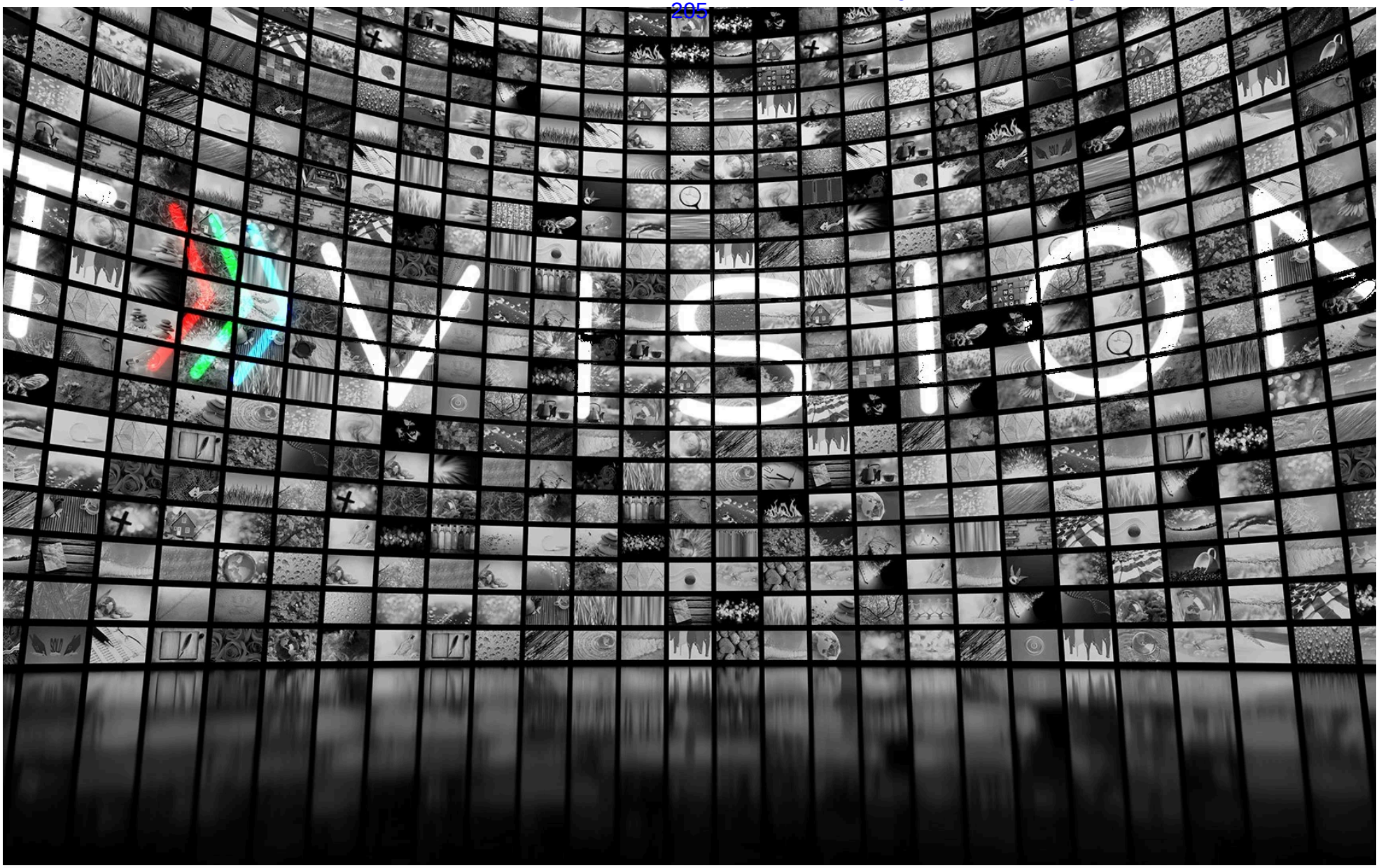
READ MORE »

BLOG

The TVision State of Streaming Report, January 2025

The latest TVision State of Streaming gives advertisers and the media industry important insights into app penetration, engagement - and for the first time - identifies share of streaming ad time across apps. Read the full report for more insights in app engagement, analysis of streaming live sports, and more.

READ MORE »



BLOG

Inscape and TVision Unlock Personified Cross-Platform Viewing Behavior for the TV Marketplace

VIZIO's Inscape, a leading provider of currency-grade smart TV data, and TVision, the company measuring every second of TV and CTV viewer engagement, announced they have extended their data partnership.

READ MORE »»

Get in Touch

Need more info, have a question or want a demo? Tell us a little bit more and we'll respond shortly.

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NETWORK & STREAMING SERVICE

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- [ ] TVISION PANEL SUPPORT
- [ ] MEDIA INQUIRIES
- [ ] MEET US AT EVENTS
- [ ] JOBS AT TVISION
- [ ] OTHER

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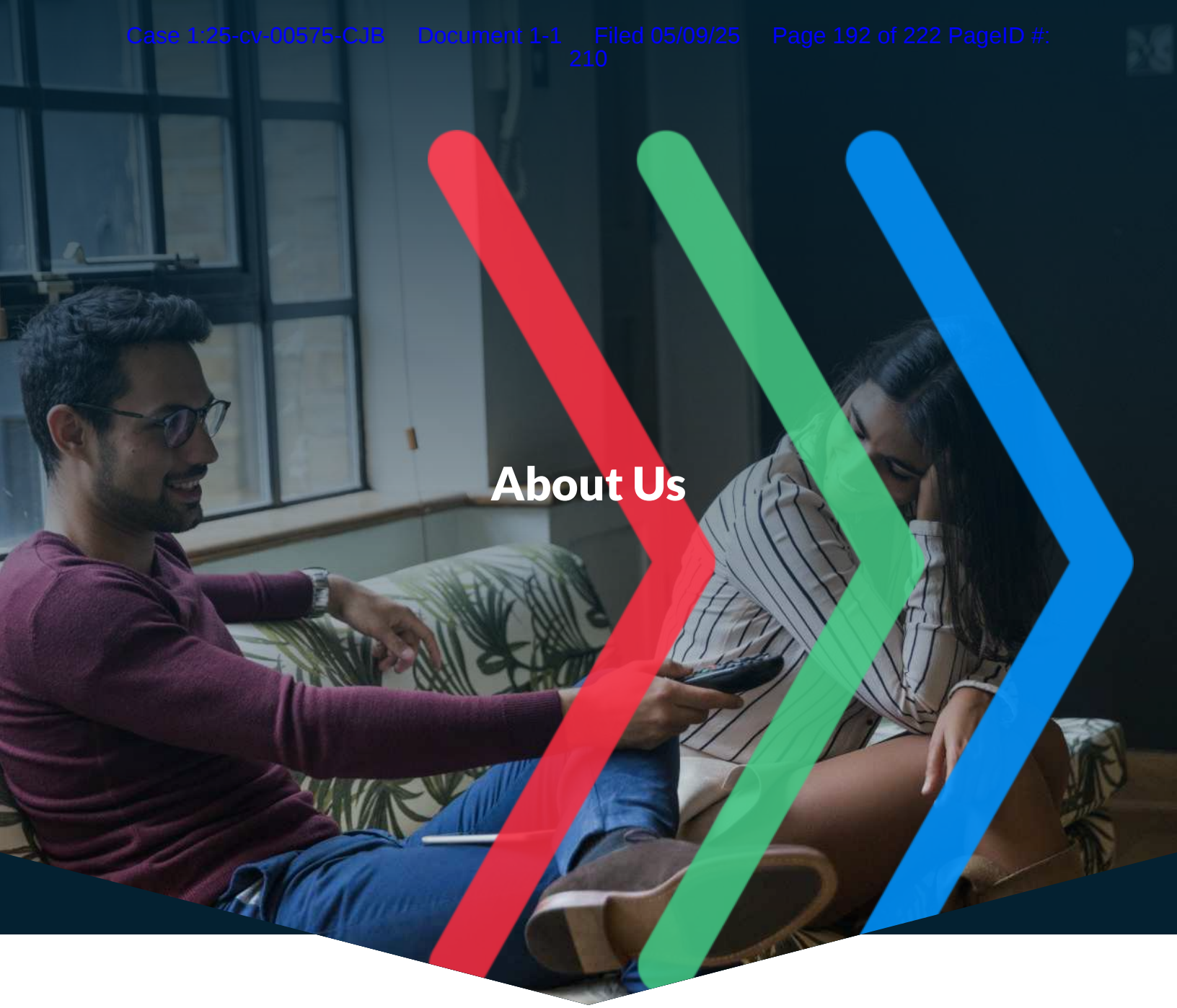


About Us

The TVision Panel enables us to measure "eyes on screen" attention to every second of programming and advertising on television.

In order to build our panel, we recruit households like yours to install TVision technology in their homes. This system uses proprietary computer vision technology to measure attention to TV shows and commercials.

Does streaming count as TV?

Where does the system get set up?

How does the system get set up?

Once you've signed the online participation agreement, we will ship you a kit from our warehouse. You connect the TVision System to your home Internet network using an Ethernet cable or you connect it to your home's WiFi network using a phone or laptop to tell it the WiFi password.

What will the TVision system detect?

How do you know what's on my television?

How do you keep my data secure?

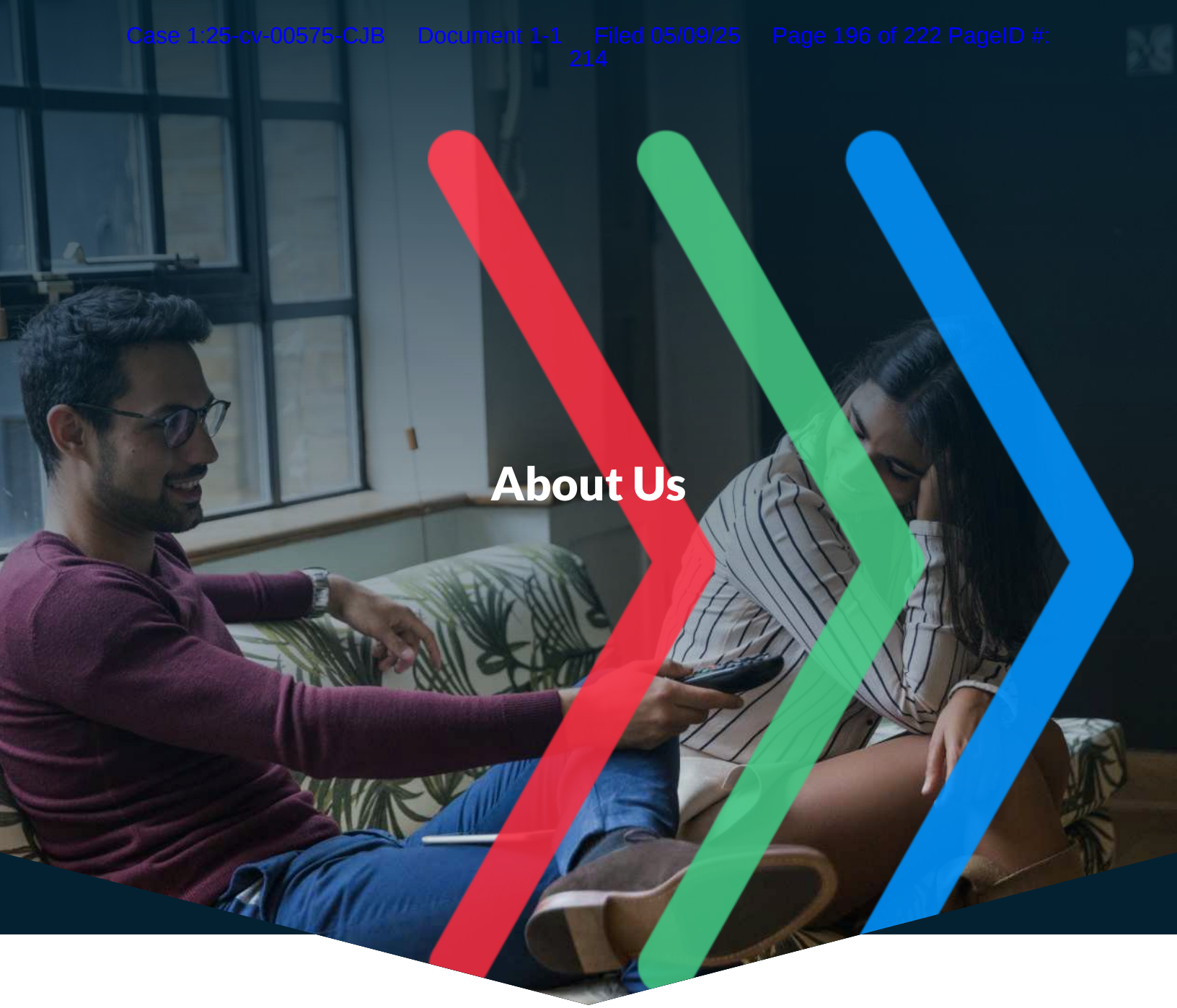
How do you use the data?

How will I be rewarded?

How can I apply?

What happens if I move?

What if I have a question? Who can I reach out to?



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Does streaming count as TV?

Where does the system get set up?

How does the system get set up?

What will the TVision system detect?

TVision technology measures if you're in the room and looking at the screen. To do this, the system starts out in Training Mode, where it captures headshot images of your household members' faces from forehead-to-chin, ear-to-ear. It's not able to capture backgrounds or body shots. The system uses those images to tell the viewers apart and map in their demographics from your household profile. An anonymized ID is created for each person. This attention data is transmitted back to TVision in a text file. The TVision System does all the work, so rest assured, no one is ever watching you!

The system captures audio of the program airing on your TV and maps it to the audio tags associated with such programs from our database. This enables us to understand what shows and commercials are on your screen. Our system is not listening for or recording your conversations, it's only able to recognize audio tags that we have subscribed to in our database.

The system will determine if there are any streaming devices running on your network and will ask them what content they're currently playing.

All we collect is the above data – anonymous and privacy-safe.

How do you know what's on my television?

How do you keep my data secure?

How do you use the data?

How will I be rewarded?

How can I apply?

What happens if I move?

What if I have a question? Who can I reach out to?

EXHIBIT 15

Join the TVision Panel

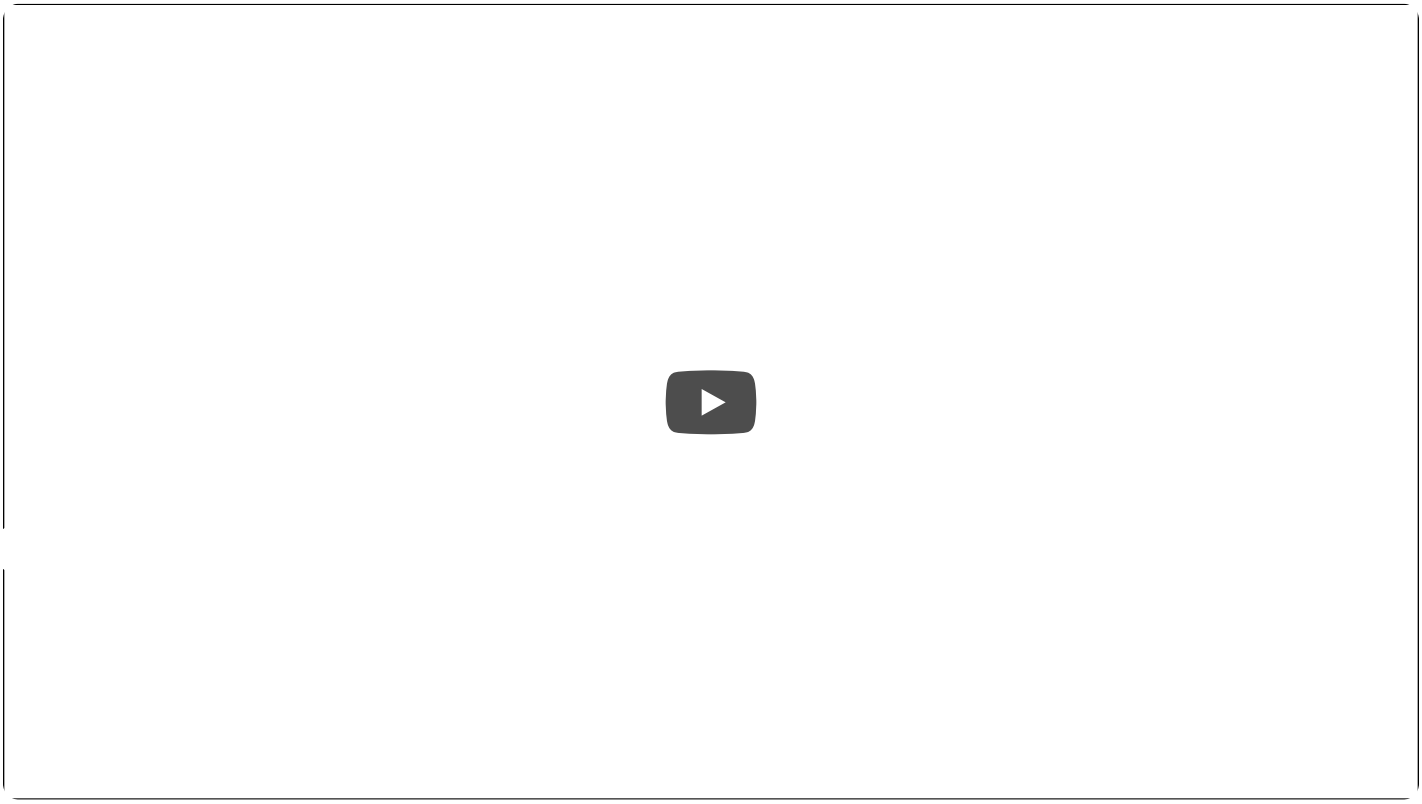
6 years ago

94 1

TVision Follow

Uploaded on Oct 16, 2018 at 2:27 pm

EXHIBIT 16



Inderbir Sidhu, CTO of TVision: Next Generation Audience Measurement

LDV Capital
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24 views 2 years ago
At this virtual event, we explored the next frontier in human existence with some of the top visionaries in this space (September 15, 2021).

The LDV team also presented the findings we published in our 2021 LDV Insights report, “Content & the Metaverse are Powered by Visual Tech”. ...more

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EXHIBIT 17

How Co-viewing and Other Factors Impact Viewer Attention to CTV

Monica Longoria

LG Ad Solutions

Yan Liu

TVision

AUDIENCE xSCIENCE 2024

#ARFAxS

Speakers

Yan Liu

Chief Executive Officer
TVision

Monica Longoria

Head of Marketing Insights
LG Ad Solutions

How Co-viewing and Other Factors Impact Viewer Attention to CTV

LG Ad Solutions + TVISION

Methodology & Objective

1,146 Online Survey Respondents
5000+ US Home Panel Data

Big Questions

1. Does CTV garner more attention?
2. Are consumers more likely to coview CTV?
3. Does co-viewing negatively affect attention?

The TVision Equipment

TVision Sensor

Person & Facial Recognition

ACR Fingerprinting

TVision Digital Meter

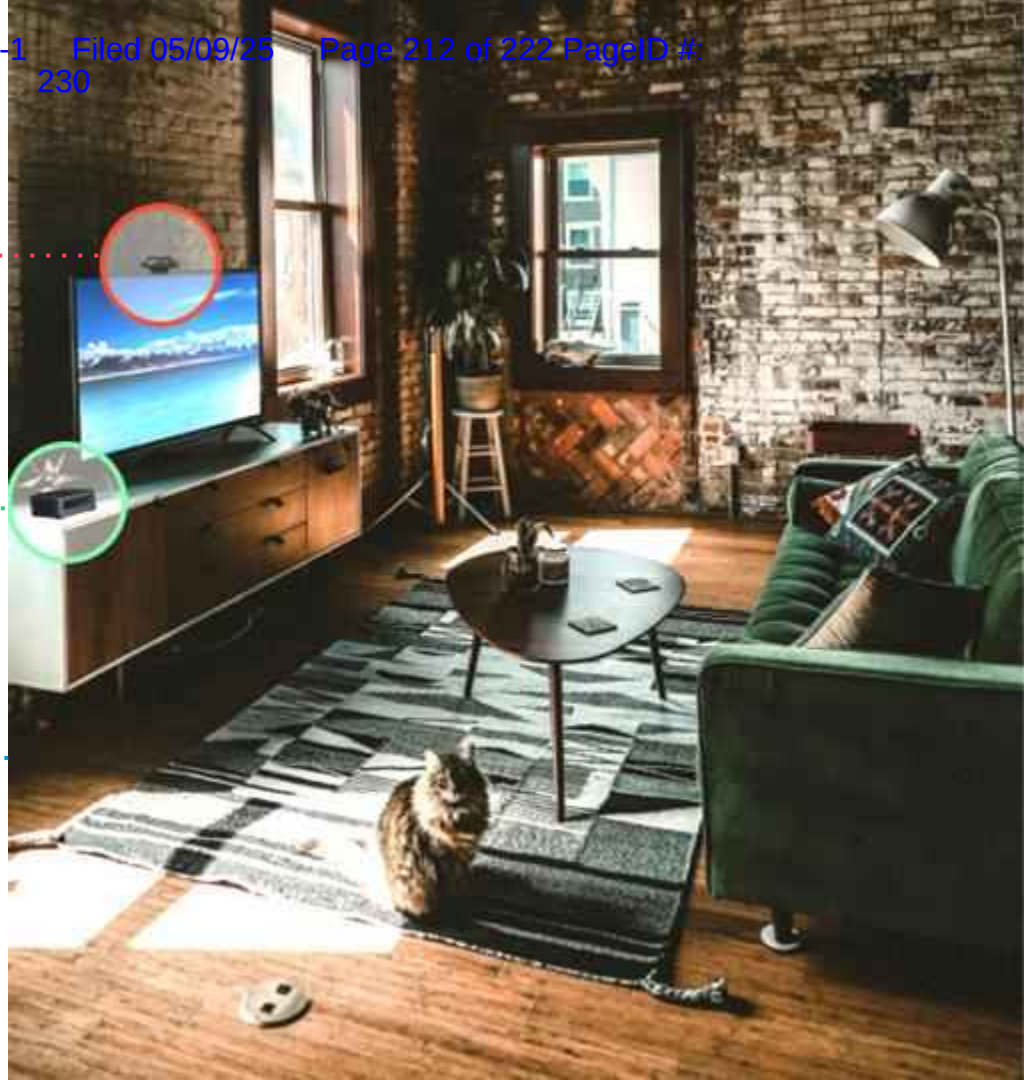
Device Detection

App Detection

TVision Measurement Engine

Remote Device Management

ACR Engine



LG Ad Solutions + TVISION

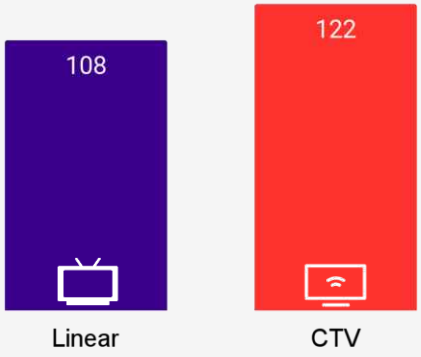
Finding #1

Ad-supported streaming households **pay more attention and co-view CTV more**

Relative to Linear TV, CTV has a

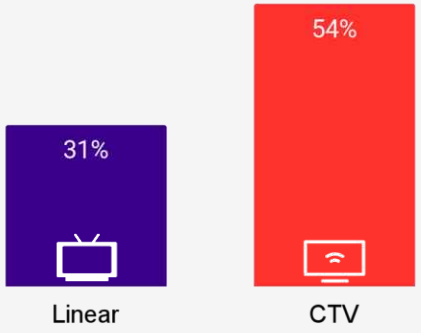
13%

Higher '**Attention**' Index



75%

Higher '**Co-Viewing**' Percentage

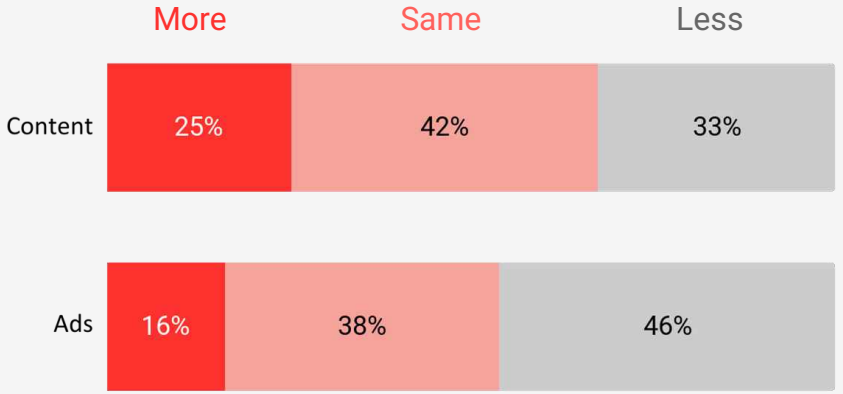


Source: Viewer Attention Study 2023

Finding #2

Streaming is a popular **co-viewing experience**, with mostly a non-negative impact to attention

Reported Impact to Attention While Co-Viewing Streaming



Source: Viewer Attention Study 2023

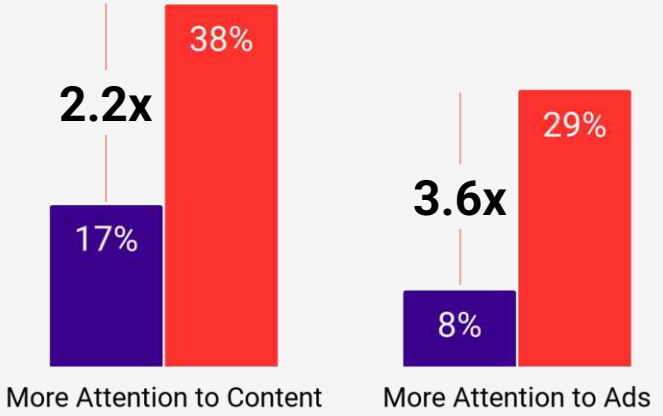
LG Ad Solutions + TVISION

Finding #3

Households with kids are more likely to pay attention to streaming content and ads

Reported Impact to Attention While Co-Viewing Streaming

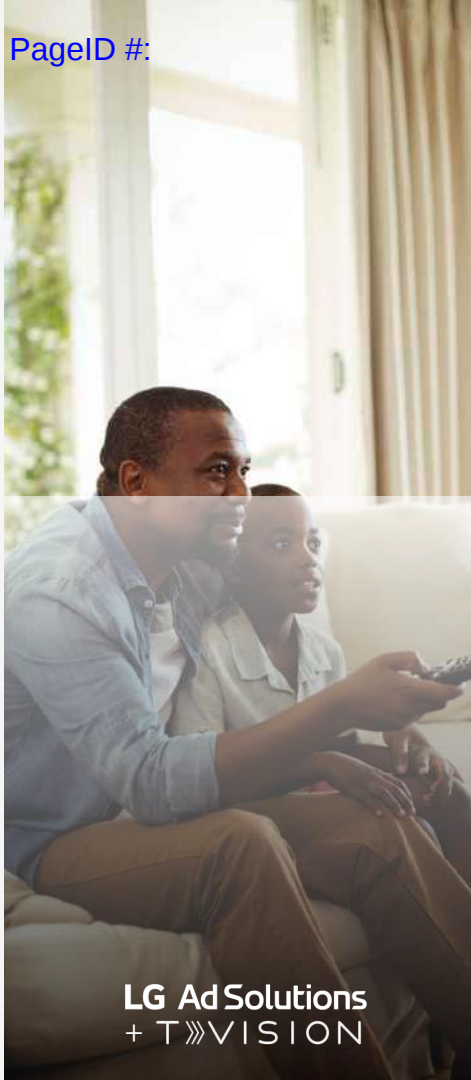
● Without Kids | ● With Kids



HH with Kids

+36%

more likely to discuss TV content while watching streaming

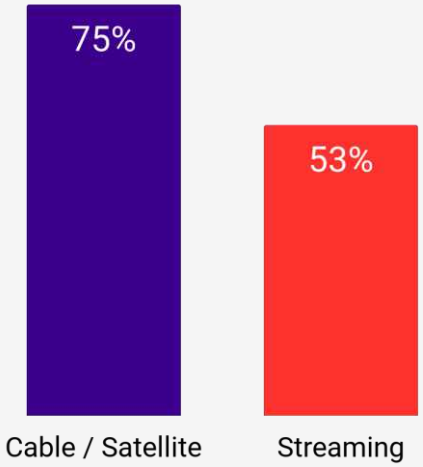


Source: Viewer Attention Study 2023

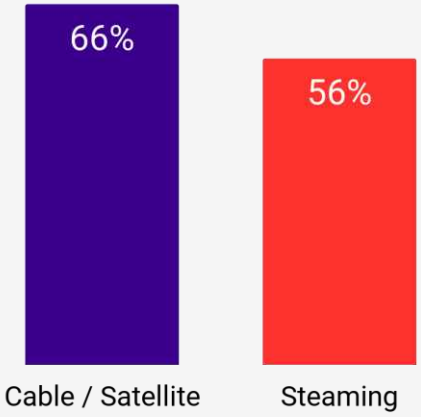
Finding #4

Streaming is gaining ground as a co-viewed method for watching sports

How Sports are Watched



Watch Sports with Others*



Source: Viewer Attention Study 2023 *Among those who watch sports

Implications for Brands and Marketers

01 — CTV offers the opportunity to create ads that further engage viewer attention

02 — Co-viewing can be an opportunity to turn your brand into a discussion

03 — Measurement providers like TVision give us new insight into viewer behavior

Thank You

Monica Longoria
Head of Marketing Insights
LG Ads

Tristan Webster
Chief Product Officer
TVision

LG Ad Solutions + TVISION

Definition of Key Metrics

Attention %

The percentage of ad impressions where a viewer watched the TV screen for 2+ seconds

Attention Time

The average amount of time per attentive impression where a viewer was watching

Co-Viewing %

The share of program views that occur with another viewer present for 5+ minutes

Attention Index

"Attention to Visible" or Attentiveness of viewers benchmarked against the average program minute

LG Ad Solutions + TVISION

EXHIBIT 18

News

News

2024.6.28 Investment

NTT DOCOMO Ventures, Inc.

NTT DOCOMO Ventures Invests in TVision Insights, Inc., The leader in person-level connected TV attention measurement

NTT DOCOMO Ventures, Inc. (Head Office: Minato-ku, Tokyo, President and CEO: Jun Yasumoto, hereinafter NDV), has invested in TVision Insights, Inc, (Headquarters: New York, USA, CEO: Yanfeng Liu, hereinafter TVision), a company that measures every second of viewer engagement with connected TV, (CTV) which is television connected to the Internet.

TVision's solution a) identifies who is watching CTV programming and ads, b) on which devices and apps, c) on a second-by-second level across hundreds of apps, and thousands of programs. TVision's maintains a fully opt-in, privacy safe panel and leverages computer vision and audio detection to passively measure what is on TV, who is in the room, and if they are engaged.

TVision's advanced technology and passive panel allows it to report more advanced viewing trends, such as co-viewing, viewability and attention, across CTV, broadcast and cable TV. TVision is the only CTV measurement solution reporting on "who paid attention" and "how much attention" The rapid spread of connected TV in the U.S. has only increased the need for advertising and marketing measures across both terrestrial broadcasting and video distribution services.

TVision has the nation's largest sample of viewers in the field of connected TV, with more than 14,000 viewers in 5,000 households, and has accumulated data on viewer engagement with programs and advertisements. TVision provides advertisers and media companies with viewing trends derived from this data via a software-as-a-service platform

NTT DOCOMO Group is strengthening its corporate marketing solutions business by leveraging its membership base of approximately 96 million members, the largest in Japan. With this investment, NTT DOCOMO Group

Representative: Yanfeng Liu, Ph.D
Business Overview: Providing a marketing platform for Connected TV using AI image analysis
URL: https://www.tvisioninsights.com/

For further information, please contact

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